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SUSTAINING ASSOCIATES

Biocides Corporation, Wasco, California, has specified that their annual payment of $500.00 is to be used as an honorarium for the person selected to give the annual Memorial Lecture. They have further specified and made funds available so that this honorarium is retroactive to the first Memorial Lecture which was given at the Salt Lake City meeting on December 3, 1953. This lecture, which was a memorial to L. O. Howard, was given by Dr. Carroll Williams of Harvard University. The 1959 lecture at Detroit, which will be in honor of C. V. Riley, will be given by Dr. Edward A. Steinhaus of the University of California.

California Spray-Chemical Corporation, Richmond, California and Washington, D. C., have announced the appointment of Robert A. Zapf as General Manager of their Central American subsidiary company, Química Ortho De California, Ltda., San Jose, Costa Rica. Mr. Zapf is a member of the Entomological Society of America.

McLaughlin, Gormley, King Company, 1715 Fifth Street, S. E., Minneapolis 14, Minnesota, have made a patent licensing agreement with Phillips Petroleum Company under which M. G. K. will conduct the sales, development and marketing of five insect repellents.

United Fruit Company, 80 Federal Street, Boston, Massachusetts, have opened their new Central Research Laboratories in Norwood, Massachusetts. Entomological Society of America members Edwin R. Wills and Louis M. Roth will carry out fundamental research on banana insects at the Laboratories.

Eli Lilly and Company, Agricultural Research Center, Greenfield, Indiana, have dedicated a new research center at Greenfield. A report on the dedication, by Entomological Society of America Delegate Leo C. Truman, will be found elsewhere in this issue of the BULLETIN.

Geigy Agricultural Chemicals, Division of Geigy Chemical Corp., Saw Mill River Road, Ardsley, New York, has announced the appointment of Entomological Society of America member Robert E. Hamman, as Technical Director.

Shell Chemical Corporation, Agricultural Chemical Sales Division, 460 Park Avenue, New York 22, New York, has designated Entomological Society of America member C. C. Compton as their Washington representative. He was formerly in the New York office.

A complete listing of our 1959 Sustaining Associates will be found on the back page of the program of the annual meeting in this issue of the Bulletin. We are, as always pleased to bring these forward-looking firms to the attention of our membership and to thank them for their support of this Society.

E. D. Hudson Company, 500 East Illinois Street, Chicago 11, Illinois is a new Sustaining Associate whom we are happy to welcome at this time.

AUTOGRAPHA O O

Annual Meeting. The planning for the joint meeting discussed in the program section of this issue of the Bulletin has been under way for several years. We expect this to be a memorable occasion; we expect to have 1,000 in attendance and we expect to see you at the Registration Desk in the Sheraton-Cadillac.

Committees. The committees who, in one way or another, have helped make the joint meeting a reality are listed in the Program. They would appreciate a kind word from appreciative members.

Twice Blessed. Please look up an item with the foregoing title on page 93 of the June, 1959 Bulletin. Those who received two copies of this issue will find the explanation there.

Notice to Members. Please read the item with this title elsewhere in this issue of the Bulletin.

Names and Addresses. The membership list will be in the December, 1959 issue of the Bulletin. Do we have you listed properly—see the address label on this Bulletin.

Home For The Society. After about 10 months of consideration, discussion, weighing of opinions and a great deal more we are about ready to close a deal, as authorized by the Governing Board, for a house which will become the headquarters of the Society. We will have full details for an article to appear in the December Bulletin.

PACIFIC INSECTS

The Entomology Department, Bishop Museum, Honolulu, is establishing a new journal entitled *Pacific Insects* during 1959. The journal will appear approximately at quarterly intervals, and will be devoted to articles on systematics and zoogeography of insects and other terrestrial arthropods from the Pacific Islands, eastern Asia, Australia and Antarctica. The journal is organ of the program "Zoogeography and Evolution of Pacific Insects." The editorial committee is as follows: J. L. Gressitt (editor), D. E. Hardy, M. A. Lieftinck, T. C. Maa, I. M. Maskarras, L. W. Quate, J. J. H. Szent-Ivany, R. L. Usinger, and K. Yasumatsu. Subscriptions ($5.00 per year) may be sent to the Business Manager, C. M. Yoshimoto, Bishop Museum, Honolulu 17, Hawaii, with payment to Bishop Museum; or sterling 1/15/6 or yens 1700 to the Business Agent, K. Yasumatsu, Kyushu University, Fukuoka, Japan.

CAREER PAMPHLETS

Dr. C. F. Smith, Head, Department of Entomology, North Carolina State College, sent in copies of *Opportunities for You in Plant Protection* and *Entomology at North Carolina State College*. These are intended for high school students and college undergraduates. Copies will be sent to interested persons who write Dr. Smith.

The Case of the Trespassing Bees[1]

By Richard L. Doutt

Department of Biological Control, University of California

Beekeepers are not particularly litigious people and yet there has developed a remarkably large body of case law pertaining to honey bees. This is separate from the statutes regarding apiaries that one can find codified in many of the states. It is, instead, the substantive law derived from a long series of judicial decisions. Legal purists go so far as to maintain that such case law is the only real authority since the interpretation of a statute is rendered only through a judicial decision. However this may be, in reviewing the reported Anglo-American cases on bees it is evident that the issues have changed over the years, and thereby reflect the social and economic evolution of the western world. Controversies which drove the litigants into court a century or more ago would seldom, if ever, arise in our modern life. Similarly, many disputes which reach the courts today would have been meaningless to our ancestors. The early cases have an especially rural flavor, and the ownership of a bee tree or the title to a swarm of bees would be hotly and bitterly contested in the courts. One judge has said that, "We moderns may wonder at the completeness of the law of bees, and at the attention and time that has been expended upon what we regard as a trivial subject. Nothing is trivial that involves human rights. Besides, it may be remembered that, in the days of those whom we term the ancients, the bee occupied a much more important place in the economy of the state than it does now. In Greece, in Egypt, in Judea, and to somewhat less extent in the Roman provinces, honey was a most important article of commerce."[5]

In the 17th century the courts decided that bees were subject to the tithe or tenth-part tax,[4] but that the owner could pay it in honey and wax rather than in bees.[3] In later cases beekeepers appear as defendants in suits which seek to determine liability for bee stings and, particularly frequent, to recover damages for the loss of horses and mules alleged to have been killed by bees.[2, 9, 25, 30, 33, 38, 47] In modern times there suddenly appears a rash of cases that are the result of the growth of the crop-dusting industry and the peculiar problems that arise from the use of aircraft to apply insecticides.[21, 24, 26, 27, 29, 42] Here the beekeepers are the complainants, seeking remedies for damages. Some of the recent cases also mirror the tremendous urban expansion of the mid-twentieth century and the inevitable conflicts of interests that occur when a city with its zoning ordinances begins to encroach on a formerly rural scene. At this point we find the police power of the state arranged against the beekeeper,[7, 36] and in one Los Angeles case[10] the beekeeper, who sought to oppose the ruling of the city council, was taken into custody and unsuccessfully sought release on a writ of *habeas corpus* even though the merits were argued stubbornly through the courts, including the Supreme Court of the State of California.[20] Beekeepers have challenged, somewhat feebly and ineffectually, the constitutionality of various state laws concerning apiaries. Their arguments have been based either on a deprivation of property without due process of law[15] or on a placing of a burden on interstate commerce.[52] Finally, there are a number of cases involving bees that do not readily fit into any of the above categories and yet are worthy of mention as miscellany.[22, 50, 51] Entomologists although they may be saddened, will not be surprised to learn that in many insect cases that reach the courts the judge can not resist ponderous attempts at judicial humor.[8]

"*Thou hast stolen our bees . . . and thou art a thief.*":—These words brought up the pivotal question of larceny in a case[48] heard in England in 1661, and there are many similar cases on record where the right to the possession of a swarm of bees has been hotly contested. The difficulty begins with the long-held concept that no individual has title to wild animals until he has reduced them to possession. In a sense the state holds the title to unsubjugated wild animals in trust for the people, although an individual may take private possession and ownership of them (Blanchard, 1955). The antiquity of this concept is reviewed by Pufendorf (1688) who not only cites the early customs of the Jews but quotes the later practical agreement of the Roman Jurisconsults as reported in the Commentaries of Gaius (circa 160 A.D.): "Wild animals, birds and fish, that is to say all the creatures which the land, the sea, and the sky produce, as soon as they are caught by anyone become at once the property of their captor; for natural reason admits the title of the first occupant to that which previously had no owner."

Where two persons have an equal right to take certain bees into possession, they become the property of the one who first reduces them to possession.[11] However, the determination of what constitutes "reducing them to possession" can be very difficult.[1]

Even when the wild bees have clearly been reduced to possession there still may not be ownership if their captor is a trespasser upon the land where the bees were found.[40, 46] Cases have held that the finding of bees in a tree standing on another man's land gives the finder no right to the bees for the only property in them is *ratione soli* by the owner of the land.[12, 28] Similarly a land owner is the owner *ratione soli* of honey made by bees in a tree on his land, and no property may be claimed by another by reason of seeing the bees hive in the tree or finding the honey.[12, 19]

Yet this property right of the landowner in the products of wild bees on his land is surprisingly qualified and of a precarious nature. As recently as 20 years ago in New York a court held that the taking of honey produced in a tree on another's property by wild bees which had never been reduced to possession did not constitute larceny.[34, 35] Even though the defendants had pleaded guilty to petit larceny before the justice, the court said they had pleaded guilty to an act which is not a crime and therefore the court reversed the convictions, discharged the defendants, and remanded the fines. This court reached backward 127 years for a precedent, to a Pennsylvania case[49] decided in 1811.

This Pennsylvania case[49] was an action of slander. The defendant had confined wild bees in a skep in the top of a tree in which they had swarmed, and when they were afterward taken by the plaintiff the defendant felt he was justified in calling the plaintiff "a damned thief." However, the court held the justification was not good because the taking of such bees would not constitute larceny. One judge said, "The taking of wild bees has been considered by the people of the country as a species of hunting. Bees are of a wild nature; and without deciding what the law might be if they were removed from the tree and secured in a hive, I am of the opinion that while they remain in the tree, they are not the subject of a felony. This wild nature remains unchanged, nor are they completely, and for any valuable purpose, reduced to possession." Another judge in the same case made the following statement regarding the larceny of bees and honey; "The question then will be whether the taking honey from a tree on the land of another, with an intention of concealment, will amount to a felony. This must depend on the honey being the property of the owner of the land. If the bees are his property, the honey is; for it is the manufacture of his hive. It is the production of what may be called his flock. But this requires proof, in the first instance, that the bees

[1] Each of the superscript numerals used in the text refers to the appropriate case in the Table of Cases.

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are his property. The treeing on his land may form some presumption of it; but this is not sufficient in a criminal case; when it is notorious in natural history that there are wild bees, or bees *ferae naturae*, as in the learned phrase. Bees not reclaimed from their wild nature and domesticated, are not the subject of property, any more than wild fowl or beasts. It cannot necessarily be inferred, therefore, that the honey made in a tree on another's land is made by the bees of the owner of the land."

It seems very clear then that when in the wild state, unreclaimed, and not reduced to property, bees are not the subject of larceny. In a Mississippi case[8] proof of a charge of stealing a bee tree did not support an action of slander, for the court held that larceny could not be committed of wild, unreclaimed bees such as would be imported by the word "bee tree". The court said that the term "bee tree" relates to the wild, and not to the reclaimed, insect. The same court said that the term "tree" is applicable to standing timber only. In an earlier case[19] it was also held that an action of slander could not be predicated on a charge that the plaintiff had stolen a bee tree, although the court in that case treated the charge as being a charge of stealing a tree rather than bees (39 A.L. R. 358).

However, when bees are clearly in the possession of any person they are the subject of larceny.[16, 45] For, although not fit for food themselves, their honey is, and for that reason they are deemed to be within the common law rule that animals *ferae naturae*, when reclaimed or confined, are the subject of larceny if fit for food.[18]

With the owner in prompt pursuit:—It was generally held as common law that the ownership in a wild animal ceased when the animal reverted to its wild state without intention of returning to the premises of the owner. Since early times an exception was made in the case of bees which swarmed from their owner's hives. Courts have held that his qualified ownership of the bees continues so long as he can pursue them and keep them in sight or so long as he can distinguish and identify them.[5, 14, 28] Plato is said (Pufendorf, 1688) to have ruled: "If any one, by decoying the bees, gets possession of another's swarms and draws them to himself by making noises, he shall pay the damage." It is interesting to compare this ancient Greek law with the facts in a New York case[5] decided in 1916. A workman on a house saw a swarm of plaintiff's bees in the air and "pounded on tin and brought them down." He gave the swarm to a friend that evening and the plaintiff charged him with larceny. The court refused to entertain the charge of larceny but acted as arbitrator to determine the ownership of the bees. The court made the case turn on the question of identity, and since the plaintiff or his employee kept the bees in sight until they alighted, his ownership had not been lost.

In an English case[29] of 1907 the beekeeper had seen his bees swarm and alight in his neighbor's apple tree. The neighbor's son shook the bees to the ground where they remained in a cluster. When the beekeeper was permitted to go on his neighbor's property to hive the bees they flew away. The beekeeper brought an action for loss of the swarm of bees and the court held: (1) The property in the bees remained in the plaintiff when they alighted on the neighbor's tree for the plaintiff had not lost sight of them and could identify them; (2) The shaking of the bees from the tree was an illegal act, and if the bees had flown to the sky instead of clustering on the ground, defendant would have been liable for destroying the plaintiff's chances of taking his bees; (3) In the present case the wrongful act of the defendant caused no appreciable damage to plaintiff and the action failed.

In Scotland it has been held[17] that when bees swarm from a hive they remain the property of the owner so long as he is pursuing them where he is entitled to go. If they come upon another person's land, that person is entitled to prevent pursuit on his land, and if they are hived by that person, they become his property. This ruling was upheld in England in 1939 in a case[25] which said: "The owner of a swarm of bees has no legal right to follow the bees on another man's land. When a swarm of bees settles on another person's land, the former owner loses his right in them, which again become *ferae naturae*."

These two British cases are distinctly contrary to the American rule which follows the stream of law on bees since Greek and Roman times. American courts have held that a mere temporary escape of bees does not divest the title of the owner *per industriam*. They remain his property. A stranger can not acquire title if the owner promptly pursues or can identify them although they alight upon the land of another where the owner can not get them without becoming a trespasser himself.[14, 28]

Once title is established then all the ordinary rights in property attach. Bees are therefore the subject of bargain and sale, and an action will lie for the recovery of the purchase price of bees sold.[44] On the other hand, the purchaser can bring action on a breach of warranty if the sale has been fraudulent. In one case,[42] which was an action on a promissory note given in part payment of the price for five colonies of bees, the maker of the note, as a counterclaim, set up damages for fraud in the sale of the bees. It appeared that the plaintiff had represented that the bees were all clean and free from disease; that the five colonies purchased were placed near eight other colonies, and that disease destroyed them all. It was held that the defendant was entitled to recover for the loss resulting from the breach of warranty. There is a California case[41] which held that an action would also lie for breach of a contract to care for bees.

Bees are not rabbits:—While bees are not like rabbits nor poultry can one say that they are not domestic animals? This can be a very important question. For example there is a zoning ordinance in Los Angeles (Los Angeles Municipal Code, section 12.08, subdivision A) which sets forth the only purposes for which lots in a certain residential zone may be used. Among these permitted uses are: "The raising of poultry, rabbits and chinchillas, and the keeping of *domestic animals* in conjunction with the residential use of a lot.... In 1957 a beekeeper was prosecuted and convicted in Superior Court of violating this ordinance in spite of his argument that his bees qualified as domestic animals.[36]

The court should not be criticized for interpreting "domestic animals" in the zoning ordinance as not including honey bees, for there has historically been a reluctance to face the issue squarely, and there has been fence straddling on this classification for centuries. According to Pufendorf (1688) Pliny says: "Since they are neither domesticated nor wild"; yet others divide them into "wild or wood bees and quasi-domesticated bees." In one Iowa case[23] it was pointed out that bees, while generally classified as *ferae naturae* are so useful and common as to be all but domesticated. And in a New York case[5] of over a century ago it was said that "if courts are to take judicial notice of the nature of things so familiar to man as bees, which I suppose they would be justified in doing, then I would observe that, however it may have been anciently, in modern days the bee has become almost as completely domesticated as the ox or the cow. Its habits and its instincts have been studied, and through the knowledge thus acquired it can be controlled and managed with nearly as much certainty as any of the domestic animals; and although it may be proper still to class it among those *ferae naturae*, it must nevertheless be regarded as coming very near the dividing line".

The California cases[10, 20, 36] indicate a trend of the modern courts to uphold zoning ordinances which prohibit the keeping of bees within the city limits. For many years beekeepers have relied on a case[7] which arose in Arkansas. The city of Arkadelphia in May 1887 adopted an ordinance which read:

"Be it ordained by the Council of the City of Arkadelphia, that it shall be unlawful for any person or persons to own, keep, or raise bees in the City of Arkadelphia, the same having been declared a nuisance.

"That any person or persons keeping or owning bees in the City of Arkadelphia are hereby notified to remove

the same from the corporate limits of Arkadelphia within 30 days from the date thereof."

In June 1887 the defendant was given notice to remove his bees. This he did not do and he was arrested on January 2, 1888 and fined day after day for ten successive days. He did not pay his fines, so was committed to jail by order of the mayor of Arkadelphia. The case eventually went to the Supreme Court of Arkansas which struck down the ordinance as being too broad. The court said: "Neither the keeping, owning, nor raising of bees is in itself a nuisance. Bees may become a nuisance in a city, but whether they are so or not is a question to be judicially determined in each case. The ordinance under consideration undertakes to make each of the acts named a nuisance, without regard to the fact whether it is so or not, or whether bees in general have become a nuisance in the city. It is therefore too broad, and is invalid."

The California Supreme Court, on the other hand, says[30] that whether beekeeping may be pursued at all within a city's confines is a question for the city's legislative body to determine, and the propriety of regulating the use to be made of property in the interest of public health and welfare may not be questioned so long as the attempted regulation is not unreasonable or arbitrary. The ordinance under which the petitioner was convicted provides: "No person shall keep any bees in or upon any premises in this city. Nothing in this section shall be deemed or construed to prohibit the keeping of bees in a hive or box located and kept within a school house for the purpose of study or observation, or to prohibit the keeping of bees within that certain territory annexed to this city on May 22, 1915, and known as the 'San Fernando District', and that certain territory annexed to this city on June 14, 1916, and known as the 'Westgate District'."

The ordinance was an outgrowth of a prohibition against the keeping of bees enacted by the Los Angeles city council in 1905. The 1905 statute expressly included the power to regulate or prohibit the "keeping of bees" specified as one of the subjects of police regulation which included also gambling houses, bawdy houses, and "any and all obnoxious, offensive, immoral, indecent or disreputable places of business or practice."

The attitude of the California courts is clearly seen in the following opinion rendered by the District Court of Appeals[10] whose decision was affirmed by the Supreme Court of California.[30]

"There is discrimination in the ordinance, as there must be in all ordinances of this type, but discrimination alone, unless it be wholly unreasonable, will not invalidate an ordinance. . . . The tests of validity in such cases are: Does the ordinance bear a reasonable relation to the public health, morals, safety or general welfare; have the districts been created according to a fair and rational plan?" The court goes on to admit the ordinance is not perfect, but in general well patterned. "The business of keeping bees has been excluded from nearly all of the city proper. Such exclusion is not unreasonable. City people unaware of the inherent proclivity of bees to attend to their own business, and not understanding that bees are by nature retaliatory rather than aggressive, become excited and apprehensive of unprovoked assault when bees appear, confusing their motives with those of the mosquitoes. Bees annoy them. But more serious than mere annoyance is the fact that the not infrequent combination of a bee and an excited motorist in the same automobile presents a major traffic hazard. And because the business of bees keeps them on the wing most of the time, their hives must be removed quite a distance from the centers of population, if the city people are to have the protection which they are believed to require. This the ordinance attempts to accomplish. Petitioner's property may be of a sufficient size to allow her lawfully to keep other creatures which are welcome in a rural community, but offensive to neighbors when harbored in the city. But this fact does not aid her case. Regulation which would be adequate in the case of goats, rabbits or other animals which may be confined within property lines (*non constat* that the odors do not remain vagrant), might be wholly ineffective as applied to bees. . . ." Also the court said that "it is no objection to the legality of the result that the apiarists are to be found on one side of the street but not on the other."

For six years of bee stings, "six cents damages":—In a New York case[31] of 1889, a large quantity of bees (140 hives) were kept on a small town lot next to plaintiff's lot and dwelling. An action was brought to enjoin a nuisance and for damages. The plaintiff claimed that the defendant's bees interfered with the quiet and proper enjoyment and possession of his premises, "driving him, his servants, and guests, from his garden and grounds, and stinging them, interfering with the enjoyment of his home, and with his family while engaged in the performance of their domestic duties, soiling articles of clothing when exposed on his premises and making his dwelling and premises unfit for habitation, and unsafe, constituting a nuisance to plaintiff's damage of $1500." Furthermore he alleged that he had notified the defendants of the injuries and requested them to move the bees which they refused to do. The jury found that the bees did constitute a nuisance, but that the damages suffered by plaintiff for the period of six years amounted to six cents.

The defendant tried to reverse the decision on appeal by arguing that the damages, "as indicated by the verdict, are trifling and that a lawful and useful business is interfered with." The injunction was upheld as the court said it was a case calling for some permanent relief and "the bees can be removed, without material injury, to a locality where neighbors will not be affected."

In a 1953 case,[37] also in New York, a grand jury indictment was upheld which charged a beekeeper with the crime of maintaining a public nuisance. The court said "while defendant admittedly has a right lawfully to maintain a colony of honey bees on his premises, he is nevertheless charged with a duty of maintaining them in such a manner that they will not annoy, injure, or endanger the comfort, repose, health or safety of any considerable number of persons or to render a considerable number of persons insecure in the use of their property and that if he omits to do so, he is subject to an indictment for the crime of maintaining a public nuisance as defined in Section 1530 of the Penal Code."

There have been attempts[9, 32]—unsuccessful ones—to impose absolute liability on beekeepers for injuries inflicted by bees. Here again we see discussions of whether bees are wild or domestic animals. One Mississippi case[2] states the general rule that "as bees are useful to society, and are property of value, the ordinary rule as to wild animals, imposing absolute liability for the injuries inflicted by them, is not applicable to bees; but the rule of domestic animals, that is, that the owner must know of their vicious tendencies, (applies)."

The authorities seem to agree that the basis for liability for injuries done by bees is negligence on the part of the owner (see Campbell, C.P. 1924). While a person does not keep bees at his peril, he may not keep them negligently,[20] that is, in dangerous quantities or locations,[25, 32] in disregard of known vicious conduct on their part,[3, 32] or in a way that creates a nuisance through interference with the fair enjoyment by others of their rights[27] (Blanchard, 1955). An analysis of this was also made by Judge Leslie Burr (see Root, 1947).

The case of the trespassing bees:—The advent of the crop-dusting industry with its use of aircraft to apply insecticides has created important problems for beekeepers. A specific account of the extent of the damage to beekeepers of Yolo County, California and the intensity of the resulting conflict between crop-dusting tomato growers and beekeepers is given by Whitcombe (1955). In viewing the problem objectively it has been conceded by the courts[29] that, in itself, dusting of crops to kill pests is a necessary and lawful operation which the farmer may perform either himself or through his servants or may have performed by an independent contractor.[21] In fact the statutes may in

certain circumstances require the farmer to treat for pests (see California Agricultural Code, sections 135, 136). However, such preventative measures cannot be used with absolute impunity, and the owner of premises may be liable to damages for spreading poisonous dusts and sprays negligently.[6, 26, 27, 29, 42] Furthermore, the owner cannot escape liability for damages if the crop duster whom he hires is negligent.[27, 42] This is an exception to the general rule that an employer is not liable for the negligence of an independent contractor. The exception is based here on the fact that the spreading of poisonous insecticide is considered by the courts to be inherently dangerous.

If the beekeeper seeks to recover for losses sustained because of crop dusting he must prove negligence on the part of the farmer or his employee or the independent contractor.[31] On the other hand, contributory negligence on the part of the beekeeper may be pleaded as a defense, for in one California case where the beekeeper did not take measures to protect his bees he was not permitted to recover for their loss because of his contributory negligence.[34]

In several of the crop-dusting cases the question of whether the bees were trespassers on the dusted fields has been raised.[31, 34, 36] Here the argument of the defendant has been that if the bees were trespassers on his land then he was under no duty to protect them, and so long as he had not distributed the poison wantonly, maliciously, or with deliberate intent to injure or destroy the bees he was not liable for damages. Perhaps the first time that bees were called trespassers was in 1904 when an action of *trespass quare clausum fregit* was brought unsuccessfully by a complainant who alleged that the bees "broke and entered into the said close where the mules were standing and did attack, sting, and bite the said two mules."[38] In the latest and clearest case[34] where the trespassing bee theory is entered the court said "there was no duty on the defendants or owners of the land to protect plaintiff's trespassing bees from the dangers of said poisonous compound." Further on the same court says, "An owner is not liable for death to trespassing animals from poison on his premises where the poison was intended for another purpose, and he was not guilty of gross or wanton negligence. We are of the opinion the same rule applies to trespassing bees."[34]

The trespassing bee theory has been criticized (Anonymous, 1953) as follows: "In *Jeanes v. Holtz* a California district court of appeal held that a beekeeper may not recover for losses occasioned when his bees contacted poisonous dust on defendant's and neighboring fields. Some mention of 'trespassing bees' appears, but such reasoning is questionable. Certainly one could not sue the beekeeper for trespass. If superficially related legal categories must be applied to this new problem, the rules on 'business guests' would seem more applicable in light of the value of bees in pollinating crops."

A beekeeper was allowed to recover for losses suffered by his bees when they worked adjacent land that had been sprayed with chlordane by a ground rig. The spraying was done by the beekeeper's landlord who had not given notice of the intention to spray the adjacent land. The case really hinges on negligence in a rather special landlord-tenant situation. The matter of trespassing bees was not brought up in this particular case.[6]

In regard to the measure of damages, one court in a crop-dusting case[42] pointed out that it was not the value of the individual bees that had been killed but it was the amount of damage done to the colony. The court reasoned that the colony was a sort of superorganism as follows: "The colony is a unit. The worker bees, the drones, and a queen together are valuable, but separate them and they are valueless. So a colony or hive must be thought of and treated as a unit, just as a cow or sheep is thought of and treated as a unit. As the owner may recover damages for the breaking of his cow's or sheep's leg, so may the beekeeper recover damages to his colony or hive caused by the killing or weakening of his bees. The killing or destroying of a few bees of a hive or the major portion thereof is an injury to the colony. Damages would be to the colony and not for the value of the bees as separate entities." It is interesting that the same court would not allow damages by reason of loss of increase on the grounds that such a claim was too speculative and uncertain. "What colony or how many would have doubled and swarmed in the following spring, is too much of a guess to be the basis of a claim for damages."

As a practical matter settlements for damages for injuries to bee colonies from the application of insecticides are frequently made out of court because of the difficulty of proving that poisons were applied by certain individuals and not caused by drifting poisons from other fields. The settlements are generally predicated on negligence in applying the poisons, lack of notification of beekeepers whose property might be damaged, and on visible damage to the colonies which would reduce or prevent the beekeeper, or grower, from using the bees for profit. In determining the amount of damage the value of the bees is generally considered for pollinating purposes, loss of seed or fruit crop from lack of pollination, and the loss in honey based on the production of uninjured colonies. The fact that in some situations the beekeeper may be forced to bring in more colonies to complete his pollination contract may also be considered in the final settlement.

From the foregoing it appears probable that the courts have not yet heard their last case on bees. It is impossible to predict what aspect will be emphasized in future cases. It is, however, likely that beekeepers will urge a revision of the present statutes regarding the burning of hives infected with foul brood. Since the hives can be cured by treating with certain antibiotics the present codes requiring destruction of the hives have been criticized as "medieval anti-bee laws."

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Insect Control vs. Human Nutrition[1]

By G. C. DECKER

State Natural History Survey and Illinois Agricultural Experiment Station, Urbana

THE AMERICAN PEOPLE enjoy the most abundant and varied diet of any nation in history, thanks to modern technology. At the same time the Food Protection Committee of the National Research Council warns that "Maintenance of the present nutritional status of the American public is contingent upon the continued production of an adequate food supply. Plant and animal pests rank among the foremost causes of food destruction, food deterioration, and food contamination. Hence, the necessity of protecting growing crops and produce from serious attack by insects, plant diseases, and other pests is quite obvious to all concerned" (*Safe Use of Chemical Additives in Foods, N. R. C.* (*1952*)). Such warnings notwithstanding, the American public seems prone to take our bountiful and varied food supply for granted, totally oblivious of the fact that man is engaged in a never-ending conflict with insects for every crop he grows.

When man appeared on the scene, he found insects in full possession of this planet. They had made their appearance ages earlier and had developed to a point of dominance in the animal kingdom through the exacting processes of evolution. Admirably adapted to meet the conditions imposed by their respective ecological habitats, insects were extremely well prepared for a battle of the survival of the fittest, whereas man, poorly adapted as he was, found it necessary to rely upon his far from infallible intellect not only to establish a defense against his enemies, but also, in many cases, to modify the environment in which he found himself so as to make his very survival possible (*Agr. Chem.* 9, *37* (*1954*)).

Insects, in the course of their evolution, acquired an enviable degree of fitness that permitted at least some representatives to survive, if not, indeed, thrive, in almost every earthly environment. Furthermore, their tremendous reproductive potential and rapid rate of development enables insects to make adjustments to changes in their environment in relatively short periods of time. Thus we find that insects, temporarily controlled by the forces of nature or by some recommended practice, may almost overnight appear in destructive numbers. Sometimes a change of habit is involved; sometimes it is a switch of host preference, resistance to some insecticide, or the acceptance of some previously resistant variety or crop.

Only a few of our insect problems are actually new, and most of these result from the inadvertent importation of foreign species. Nearly 100 years ago the ravages of chinch bugs, grasshoppers, armyworms, potato beetles, and a host of other pests native to the midwestern states caused many farmers to sacrifice, or in some cases abandon, their farms in favor of some less hazardous and more profitable occupation. This condition resulted in the appointment of B. D. Walsh as State Entomologist in Illinois in 1867, and the appointment of C. V. Riley to a similar position in Missouri in 1868. The fact that these appointments were independent of, but almost simultaneous with, the creation of the land-grant colleges clearly indicates the significance farmers, agricultural leaders, and legislators attached to insect control problems (*J. Agr. Food Chem.* 6, *98* (*1958*)).

To bring this problem up to date, let us recall that fruits and vegetables constitute about one third of the human diet, and that they contribute over 60 per cent of the vitamin A, 90 per cent of the ascorbic acid, and substantial

[1] Reprinted from NUTRITION REVIEWS, Vol. 16, No. 10, October, 1958.

amounts of other dietary essentials (*U.S.D.A. Misc. Pub.* 550 (*1944*)). At the same time, every orchardist and every gardener knows full well that successful commercial production of fruits and vegetables would be impossible without the use of chemical sprays and other measures applied to control insects and plant diseases (*N. R. C. Pub.* 470 (*1956*)).

These observations include the lowly Irish potato, which has not been produced without the use of insecticides since 1870. Entomologists developed reasonably satisfactory control measures for most of the insects attacking potatoes, but when DDT became available for use in 1945, it largely replaced more complicated mixtures of less effective materials. Soon reports from various sources indicated phenomenal increases in the yield of potatoes and within five years national per-acre potato yields rose to 160 per cent of the five-year pre-DDT average.

A study of USDA statistics (*USDA Agr. Statistics* (*1952*)) reveals similar increases for a number of other crops on which DDT and other more recently developed materials were used extensively: Cauliflower 120 per cent, onions 140 per cent, celery 140 per cent, sweet corn 160 per cent, and beet seed 180 per cent. Even milk production per animal jumped 15 per cent, and although this was viewed with considerable skepticism at the time, recent studies on the value of livestock sprays strongly indicate much of the gain might well be attributed to better insect control.

In nature insect control is largely biological and ecological. Most pests, whether they be weeds, plant diseases, insects, or even rodents, have tremendous reproductive powers, but for each species nature has arrayed against it a variety of dynamic forces which tend to inhibit or nullify these fantastic reproductive powers. Thus, we have a sort of natural balance wherein natural forces tend to keep plant and animal populations in a state of near equilibrium. Since nature does such an excellent job in establishing limitations on species, it would seem logical that man should thoroughly study nature, and then attempt to emulate it. This he can do, and has done successfully in many instances.

Basically, all organisms, plant or animal, require an adequate food supply, protection from their enemies or from intolerable competition, and the adequate fulfillment of their other ecological requirements. Unfortunately, agriculture had inadvertently created some of its most important insect problems through modern farm management practices, which provide an abundant food supply and other environmental conditions highly favorable to many species of insects and other pests.

In considering insect control from the long-term point of view, pest population management is, or should be, our ultimate objective, and to this end biological and ecological studies should dominate our research programs. In general, biological and ecological control measures, when developed and properly applied, have a long-lasting, and in some cases, perhaps, a permanent effect, on pest populations. Thus, they are not only practical but also exceedingly economical and sound. While biologists generally regard the development of appropriate biological and ecological control measures as fundamentally sound, at the same time they recognize that attainment of the ultimate goal, population management, would require the adoption of approved practices by most, if not all, residents in a community or area, be it large or small. Universal adoption of such practices on a voluntary basis is always difficult and frequently impossible to attain. Thus, we often find that potentially valuable ecological control measures are ineffective and impractical because they cannot attract or demand universal acceptance.

Then, too, there are many pests for which no suitable biological or ecological control measures have been developed, and for the time being, at least, pesticides constitute our only defense weapon. Furthermore, we must acknowledge that the chance or experimental application of pesticides on a variety of crops has revealed important pest losses previously unknown or grossly underestimated. At any rate, the use of insecticides is the only established protective practice available for combatting the majority of our injurious insect species and, like matrimony, it is here to stay.

Much progress has been made, but with current insect losses in the agricultural field alone estimated to be in excess of $4,000,000,000 annually, there is obviously much room for improvement. It would appear safe to estimate that insect damage to crops and animals can be reduced by 50 per cent, which would be equivalent to increasing agricultural production by about $2,000,000,000. annually. Then, too, there is a very great possibility that crop losses attributable to insects may be grossly underestimated.

To obtain a vague idea of the possible extent of unrecognized insect damage, one need only consider the magnitude of insect populations. It has been stated without refutation that the total mass of protoplasm produced by insects each year exceeds that produced by all other terrestrial animal life put together. If we recall that much of this entomological protoplasm represents lost plant and animal production that might have been more profitably converted into products for human consumption, we can arrive at only one conclusion: insect losses are of enormous proportions.

A considerable portion of the American public has become concerned with the possible public health hazard problems that might be associated with the use of insecticides and pesticides in general. Despite the assurances of the U. S. Department of Agriculture, the Food and Drug Administration, the U. S. Public Health Service, and the National Research Council that these hazards are potential, not real, and that there is no cause for alarm, there are individuals who insist that the use of pesticides is wholly unjustifiable.

Some contend they would rather eat a scabby apple, a wormy peach, or a scalecovered orange than any fruit that had been treated with a pesticide. Such a choice might conceivably be available a few days each year to the suburbanite with a fruit tree in the back yard, but, as previously noted, fruits and vegetables cannot be commerically produced without the use of pesticides.

Some enthusiasts contend that plant diseases and insects could be controlled without the use of chemicals if soils were improved by the addition of organic matter, but they ignore, or seem unaware of the fact that diseases and insects were destroying plants long before man began cultivating crops and destroying soil organic matter (*Use of Chemical Additives in Foods, N.R.C.* (*1951*)). A few ill-advised critics go so far as to say that all use of chemicals is wrong and that we should let nature take its course. The American Indian followed such a course for centuries, and found that under this policy the North American continent supported a population of about 1,000,000 souls. We now have a population in excess of 170,000,000 in the United States alone.

There seems to be little question but that insects will continue to demand tribute of enormous proportions. As highly versatile living organisms, insects are constantly changing to meet each variation in the environment whether it be biological, physical, or chemical. Therefore, if we are to hold our own in this continuing battle, research must continue undiminished; if we are to make progress, research must be expanded.

POSITIONS OPEN—POSITIONS WANTED

Associate Professor, entomology and parasitology. Desires academic change. U. S. Citizen, 40, Ph.D., C.A.P.&E., 15 years experience, numerous publications. Box 9.

Assistant Professor, zoology and entomology. Desires academic change. Ph.D., 37, publications in fly physiology, medical entomology and mite systematics. Box 11.

Teacher of Entomology. Desires position in research, extension or teaching. M.Sc., 27. Box 12.

The First Joint Meeting

Entomological Society of Ontario

96th Annual Meeting

Entomological Society of Canada

9th Annual Meeting

Entomological Society of America

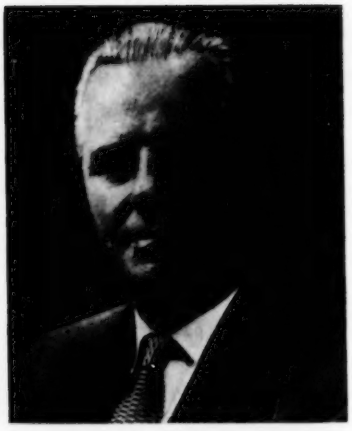
7th Annual Meeting

SHERATON-CADILLAC HOTEL

DETROIT, MICHIGAN

November 30 · · · December 3, 1959

Society Presidents



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The Emblem

The emblem on the program cover and on your identification badge links symbols of American and Canadian entomology, and thus marks our first meeting. The torch and stylized insect is derived from the emblem of the Entomological Society of America. The maple leaf with *Grylloblatta*[1] superimposed is derived from the emblem of the Tenth International Congress of Entomology at which Canadian entomologists were hosts.

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SPECIAL NOTICE

REGISTRATION DESK, *Sheraton-Cadillac Hotel, Fourth Floor*—Sunday, November 29, 5:00–9:00 p.m. Monday, November 30, 8:00 a.m.–4:00 p.m. The desk will be open December 1, 2, and 3 for the convenience of those attending.

REGISTRATION FEE. Members of any of the three Societies meeting jointly will pay $5.00; Students and Student Members, $1.00; Non-Members, $7.50; Members' wives and invitation non-member speakers, no charge.

MEMBERS' INFORMATION DESK. This desk is intended to handle all Society business except registration. Mrs. Louise B. Stone, Administrative Assistant from the Society's office, will again be in charge of this desk. May we help you?

JOBS—AVAILABLE AND WANTED. If you are seeking employees or employment, please make inquiry at the Members' Information Desk. Forms for essential information will be supplied. Be sure to enter a local contact address and/or phone number on the form.

SPECIAL EVENTS

ENTOMOLOGISTS' MIXER. This annual event is becoming a traditional entomological evening. The *Local Arrangements Committee* has made special plans this year. Admission to this complimentary event is by registration badge and all registrants are invited. Time: 5:30 p.m., Tuesday in the Crystal Ballroom.

PHOTOGRAPHIC SALON. This is the second year for the Salon. The Salon was a highlight of the Salt Lake City meeting and an equally enjoyable show is planned for Detroit. Plan to be in the Grand Ballroom on Monday evening.

EXHIBITS. This is the third year we have featured commercial exhibits as well as educational ones. Visit the Founders Room at any time during the meeting. You will find much of interest.

HOSPITALITY SUITES. Companies maintaining hospitality suites in the hotel may leave room numbers or group invitations at the Members' Information Desk. It is requested that these suites be closed during scheduled meeting sessions and at 1:00 a.m.

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HISTORIC MEETING AT DETROIT

The joint meeting of the American and Canadian Societies at Detroit makes entomological history in North America on two counts.

In Detroit we meet on the ground of the first national meeting of entomologists in America. Eighty-four years ago, in 1875, the Entomological Club of the AAAS held its first meeting here.

More important than the location of our meeting, however, is the historic significance of this first joint meeting of the American and Canadian Societies.

This event recalls the complete unity of interest and purpose that existed between American and Canadian entomologists in the early days of organized entomological research in North America. To these early entomologists the international boundary offered no bar in the pursuit of their science, and in this respect, "America" meant "North America." Indeed, the Association of Economic Entomologists was born without the prefix "American." And it was born on Canadian soil at Toronto in 1889, as the result of the mutual interests and personal friendship of the leading entomologists of our two countries, L. O. Howard and James Fletcher. The first president, elected at this meeting, was C. V. Riley whom we honor in our Memorial Lecture this year.

From these beginnings, two great national organizations for the development of entomology on this continent have arisen. This first joint meeting marks the final flowering of the beginning made at Detroit in 1875, fostered by the enthusiasm of Canadian and American entomologists working together.

We may therefore hope that this meeting at the birthplace of North American entomology will quicken again the sense of unity between Canadian and American entomologists which the pioneers in our science so clearly recognized.

THEME OF THE MEETING

The Plenary Session of a continental conference offers an opportunity to catch and examine a significant trend in current thought. In seeking such a theme the Program Committee has chosen the broad field of biological control of the subject most timely and appropriate to the current interest of North American entomologists.

The need to reexamine and extend the potential of natural control methods has been brought into sharp focus by our increasing awareness of the limitations of chemical control. It seems timely therefore to reevaluate, in the light of recent advances in knowledge, the subtler approaches to insect control through the exploitation of natural control agents and methods.

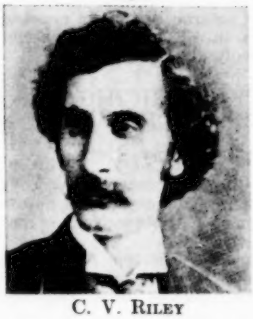
By a happy coincidence the *Memorial Lecture Committee* has selected a world authority in an important aspect of biological control to deliver the second Memorial Lecture. Dr. Edward A. Steinhaus will introduce the theme of the meeting in his address "Insect Pathology: Challenge, Achievement and Promise."

A broader treatment of the theme will be featured in the Plenary symposium on "Biological Alternatives to Chemical Control of Insects." Dr. Steinhaus will act as moderator for this symposium which will explore the frontiers of knowledge on the principals and potentialities of biological control agents and methods.

To extend our subject further and bring to the meeting the experience and fresh approach being developed in Central Europe, Dr. J. Weiser, Director of the Laboratory of Insect Pathology in the Institute of Biology at Prague, Czechoslovakia, will address a Plenary Session of the meetings on the subject, "Insect Pathology and Biological Control in Czechoslovakia and Socialist Countries."

THE C. V. RILEY MEMORIAL LECTURE

In 1957, the Governing Board, Entomological Society of America, established the Memorial Lecture series to honor a distinguished founder at the annual meeting of the Society.



C. V. Riley

The first of these was in honor of L. O. Howard. It is particularly appropriate that at this first joint meeting of the American and Canadian Societies we honor C. V. Riley (1843–1893). Prof. Riley worked closely with pioneering entomologists of both countries, and his international stature was recognized by his election as first President of the Association of Economic Entomologists at Toronto in 1889.

Riley was the first entomologist of the State of Missouri and later became Chief of the Division of Entomology in Washington, D. C.

The *Memorial Lecture Committee* is to be congratulated on their choice of Dr. E. A. Steinhaus to deliver the second memorial lecture in honor of C. V. Riley.

In the modern era of biological sciences, few men have contributed more to their profession than Dr. E. A. Steinhaus. Born in North Dakota in 1914, Dr. Steinhaus received his B.S. from the North Dakota State College and his Ph.D. from Ohio State University, specializing in microbiology and entomology. He was later appointed to the staff of the University of California at Berkeley where, in 1945, he organized the present internationally recognized Laboratory of Insect Pathology. This was the first laboratory of its kind in the world and, as its director, Dr. Steinhaus saw insect pathology as a distinct entomological discipline with widespread applicability in insect control. The ensuing years proved the validity of his vision. The role of insect diseases in natural insect abundance is being increasingly studied and their successful manipulation to man's advantage seems near fruition. A prolific writer, Dr. Steinhaus has contributed greatly to our entomological and microbiological periodicals and has written two major textbooks for students of insect pathology. He is currently editor of the *Annual Review of Entomology* and of the *Journal of Insect Pathology*.

E. A. Steinhaus

C. V. RILEY EXHIBIT

Riley is best known for his pioneering of investigations, reporting and organization of official economic entomology at a time when economic entomology in the United States was in its infancy. His enormous energy and interests were particularly successful in directing the work of assistants and in promoting public interest in entomology. Far less is known of his substantial contributions as teacher and artist. The various facets of the professional career of this distinguished Founder are highlighted by an exhibit in the Founders Room. For this interesting feature we are indebted to Herbert Knutson, who proposed the idea, and to P. C. Stone, D. G. Hall, H. H. Ross and G. C. Decker, who assisted him in its preparation.

DR. J. J. WEISER, GUEST SPEAKER

The *Program Committee* is proud to announce that arrangements have been completed for Dr. Weiser to attend our meeting. He will address the Plenary Session, Wednesday afternoon, on the subject, "Insect Pathology and Biological Control in Czechoslovakia and Socialist Countries."

Dr. Weiser is Director of the Laboratory of Insect Pathology in the Institute of Biology of the Czechoslovakia Academy of Sciences in Prague. He is an authority on protozoan diseases of insects, especially the Microsporidia, and the use of these organisms in insect control. He directs a staff of specialists working with protozoa, viruses, fungi, nematodes, bacteria and entomophagous insects as agents for insect control. The laboratory maintains important collections of these agents which are available on loan or exchange to other laboratories throughout the world.

Dr. Weiser's international status in the field of biological control is apparent from the leadership he gave to the organization and conduct of the First International Conference for Insect Pathology and Biological Control at Prague in 1958. In this and other activities, Dr. Weiser has shown a deep and continuing interest in promoting international cooperation in the field of biological control. He is a member of the Editorial Board of the *Journal of Insect Pathology*.

The *Program Committee* is grateful to the Rockefeller Foundation for financial assistance in bringing this distinguished European authority to our meeting.

HOW THE JOINT PROGRAM WAS PLANNED

The program is the outgrowth of coordinated planning by the General Program Committee and the Section Program Committees. At both levels, there was complete integration between the participating societies.

The duties of the General Program Committee were shared by the *Co-Chairmen* representing the Entomological Society of Canada and the Entomological Society of America. This Committee was responsible for the plenary features, for scheduling submitted papers, and for compiling the entire program. At the section level, *Co-Chairmen* representing the participating societies planned the section symposia and other special features of the section programs. Section *Chairmen* are listed on page 102.

Your *Co-Chairmen* can now report that these arrangements have worked exceedingly well. With no important exception, the section *Co-Chairmen* have exchanged ideas and molded their programs in a splendid spirit of cooperation. We may confidently expect that this *rapport* will extend to the meeting itself, and beyond it to the professional relations of North American entomologists.

THE PROGRAM FORMAT

The program format has been arranged to show all concurrent features in one block across the page. Concurrent sessions generally consist of four paper-reading sessions and several symposia. Titles and abstracts of concurrent papers are listed in four columns across the page. Symposia in session at the same time are shown by numbers in a center column. These numbers refer to the list of symposia titles and contributors beginning on page 106.

The basic time-unit of the program is the 12-minute interval allowed for the presentation and discussion of submitted papers. Each item of the program is, therefore, scheduled for a 12-minute interval or some multiple of 12 minutes. IT IS ESSENTIAL FOR SPEAKERS AND CHAIRMEN TO ADHERE STRICTLY TO THE SCHEDULED INTERVALS.

Section papers and symposia are numbered throughout the program. These numbers are listed with the author's name in the Index of Authors. Section papers are numbered consecutively, 1–281. Section symposia are also listed consecutively with the prefix "S", S-282–S-348. *Plenary* features are not numbered, and are indicated by name in the Index of Authors, *e.g.*, "Simmonds, F. J., Plenary Symp."

To provide a bird's-eye view of the program as a whole, the main features are blocked out by days on page 105. To assist you further, the meeting rooms are indicated on the hotel floor plans, page 149. A map showing the location of the hotel in Detroit, and routes into the city, is also included, page 148.

CANADIAN HOSPITALITY

The following Canadian laboratories in the Detroit area will welcome visiting entomologists on their way to or from the meeting.

Entomology Research Institute for Biological Control, Belleville, Ontario. Dr. B. P. Beirne, *Director*. Canadian center for basic research on predation and parasitism, and for the importation of insect parasites and predators from abroad. (330 miles from Detroit)

Entomology Laboratory, Vineland, Ontario. G. G. Dustan, *Officer in Charge*. Ecological and chemical control studies on insects attacking fruit trees. (225 miles from Detroit)

Pesticide Research Institute, London, Ontario. H. Martin, *Director*. Canadian center for basic research on insect physiology and toxicology. (120 miles from Detroit)

Entomology Laboratory, Chatham, Ontario. G. F. Manson, *Officer in Charge*. Ecological and chemical control studies on insects attacking vegetables, tobacco and corn. (50 miles from Detroit)

Research Station, Harrow, Ontario. H. R. Boyce, *Head*, Entomology Section. Ecological and chemical control studies on peach and greenhouse insects. (25 miles from Detroit)

Insect Pathology Research Institute, Sault Ste. Marie, Ontario. J. W. MacB. Cameron, *Director*. Canadian center for basic research on insect viruses, fungi and bacteria. (370 miles from Detroit)

TOUR: UNIVERSITY OF MICHIGAN, ANN ARBOR, MICH.

8:00 a.m.–5:30 p.m., Thursday, Dec. 3.

This tour will include visits to the Museum of Zoology, Insect Collections, Insect Sound Laboratory and Forest Insect Laboratory. A program for wives accompanying husbands is also planned.

While this feature was planned by Section A, General Entomology, it is open to all interested members. The university has kindly provided transportation from the hotel to the campus and return. Reservations for transportation must be made at the registration desk not later than Tuesday evening. Dr. T. H. Hubbell, Director, Museum of Zoology, will be in charge.

LADIES ACTIVITIES

Please make enquiries when registering.

Information available at the registration desk.

THE PROGRAM AT A GLANCE

	MONDAY, NOV. 30	TUESDAY, DEC. 1	WEDNESDAY, DEC. 2	THURSDAY, DEC. 3
9:00	**OPENING SESSION** **PRESIDENTIAL ADDRESSES**	SECTION PAPERS 69–81. AND SYMPOSIA 4, 5, 6.	SECTION PAPERS 111–131. AND SYMPOSIA 7, 8, 9, 10.	SECTION PAPERS 184–202. AND SYMPOSIA 14, 15.
RECESS				
12:00	**MEMORIAL LECTURE** **BUSINESS: ESA, ESC**	SECTION PAPERS 82–110. AND SYMPOSIA 4, 5, 6.	SECTION PAPERS 132–151. AND SYMPOSIA 7, 8, 9, 10. **BUSINESS: SECTIONS, ESO**	SECTION PAPERS 203–228. AND SYMPOSIA 14, 15.
LUNCH				
1:30	**BUSINESS: SECTIONS, ESO** SECTION PAPERS 1–24. AND SYMPOSIA 1, 2, 3.	**PLENARY** **SYMPOSIUM**	SECTION PAPERS 152–183. AND SYMPOSIA 11, 12.	SECTION PAPERS 229–260.
RECESS				
5:30	SECTION PAPERS 25–68. AND SYMPOSIA 1, 2, 3.	**PLENARY** **SYMPOSIUM** (Contd.)	**PLENARY SESSION:** **GUEST SPEAKER** **BUSINESS: ESA, ESC**	SECTION PAPERS 261–281.
DINNER		**ENTOMOLOGISTS' MIXER** **5:30 - 7:00**		
	PHOTO SALON **8:00**	**BANQUET** **7:30**	**4-H CLUB DEMONSTRATION** **8:00** **ENTOMOLOGY IN U.S.S.R.** SYMPOSIUM 13 **8:15**	

SECTION SYMPOSIA

The following symposia are scheduled by number in center column of the General Program which follows.

Symposium 1

Sect. A. Gen. Entomology
Monday, Pan-American Room

Methods and Concepts in Insect Zoogeography.
Moderator: E. G. MUNROE, Ent. Res. Inst., Ottawa, Ont.

1:54 282. Theoretical Approach to Insect Zoogeography.
E. G. Munroe, Ent. Res. Inst., Ottawa, Ont.

2:42 283. Phyletic Approach to Insect Zoogeography.
H. H. Ross, Ill. Nat. History Survey, Urbana.

3:42 284. Field and Survey Methods in Insect Zoogeography.
J. L. Gressitt, Bishop Museum, Honolulu.

Symposium 2

Sect. B. Physiol. & Toxicol.
Monday, Grand Ballroom

Plant-Insect Relationships.
Moderator: R. D. O'BRIEN, Pesticide Res. Inst., London, Ont.

1:54 285. Perspectives of Plant-Insect Relationships.
H. Martin, Pesticide Res. Inst., London, Ont.

2:18 286. Attractancy and Repellency in Phytophagous Insects.
V. G. Dethier, Univ. of Penn., Philadelphia.

2:42 287. Host Specificity in Phytophagous Insects.
A. J. Thorsteinson, Univ. of Manitoba, Winnipeg.

3:18 288. Chemical Basis of Plant Resistance to Insects.
S. D. Beck, Univ. of Wisc., Madison.

3:42 289. Insect-Host Plant Relationships in the Tobacco Hornworm and Colorado Potato Beetle.
R. T. Yamamoto, Univ. of Ill., Urbana.

Symposium 3

Sect. Ea. Extension
Monday, Parlor H

Refitting Extension Programs to the Changing Times.
Moderator: W. J. COLBERG, N. D. Agr. Coll., Fargo.

1:54 290. A Look at Extension's Educational Responsibilities.
G. H. Huffman, Federal Extension Service, USDA, Wash., D. C.

2:18 291. Some Problems Encountered in Integrated Agricultural Programs.
G. D. Jones, N. C. State Univ., Raleigh.

2:42 292. How Are We Doing on Insect Control Recommendations?
H. B. Petty Jr., Univ. of Ill., Urbana.

3:18 293. The New York State 4-H Entomology Program: Past, Present, Future.
P. H. Wooley, N. Y. S. Agr. Coll., Cornell Univ., Ithaca.

3:42 294. Evaluating Extension Programs.
R. L. Janes, Mich. State Univ., East Lansing.

Symposium 4

Sect. A. Gen. Entomology
Tuesday, Michigan Room

Status, Organization and Future Development of Insect Collections in North America.
Moderator: J. A. SLATER, Univ. of Conn., Storrs.

9:00 295. University and College Insect Collections.
J. L. Laffoon, Iowa State Coll., Ames.

9:24 296. The Canadian National Insect Collection.
G. P. Holland, Ent. Res. Inst., Ottawa, Ont.

9:48 297. Larger Private Museum Collections.
Mont Cazier, American Museum of Nat. History, N. Y. City.

10:24 298. The National Insect Collection.
J. F. Gates Clarke, U. S. National Museum, Washington, D. C.

SECTION SYMPOSIA

The following symposia are scheduled by number in center column of the General Program which follows.

Symposium 5

Sect. Cb. Apiculture
Tuesday, Pan-American Room
Food Gathering Behavior of Hymenoptera (Part 1) (Co-sponsored by International Union for Study of Social Insects).
Moderator: M. D. LEVIN, U. S. Legume Seed Lab., Logan, Utah.

9:00 299. Food Gathering Behavior of Ants.
E. O. Wilson, Biol. Lab., Harvard Univ., Cambridge, Mass.

9:24 300. Food Gathering Behavior of Wild Bees.
G. A. Hobbs, Ent. Res. Inst., Lethbridge, Alberta.

9:48 301. Food Gathering Behavior of Stingless Bees.
W. E. Kerr, Dept. of General Biology, Rio Claro, Brazil.

10:24 302. Food Gathering Behavior of Honey Bees on Fruit Crops.
W. R. Lee, Univ. of N. H., Durham.

Symposium 6

Sect. E. Control, Extension, and Regulatory Entomology
Tuesday, Parlor H.
Insect Control Problems of Mutual Interest to Canada and the United States.
Moderator: C. W. FARSTAD, Plant Protection Div., CDA, Ottawa, Ont.

9:00 303. Extension, Canada.
W. H. Gable, Ontario Agr. Coll., Guelph, Ont.

9:24 304. Extension, United States.
R. L. Janes, Mich. State Univ., East Lansing.

9:48 305. Plant Pest Control, Canada.
F. E. Webb, Forest Biol. Lab., Fredericton, N. B.

10:24 306. Plant Pest Control, United States.
H. R. Smith, ARS, USDA, Moorestown, N. J.

10:48 307. Plant Quarantine, Canada.
L. L. Reed, Plant Protection Div., Ottawa, Ont.

11:12 308. Plant Quarantine, United States.
H. M. Sartov, ARS, USDA, N. Y. City.

Symposium 7

Sect. Ca. Biological Control
Wednesday, English Room
Approaches to Biological Control.
Moderator: P. W. OMAN, ARS, USDA, Beltsville, Md.

9:00 309. R. E. Balch, Forest Biol. Lab., CDA, Fredericton, N. B.

9:36 310. D. A. Chant, Ent. Res. Inst. for Biol. Control, CDA, Belleville, Ont.

10:24 311. C. A. Fleschner, Dept. of Biol. Control, Citrus Exp. Sta., Riverside, Cal.

11:00 312. C. H. Hoffmann, ARS, USDA, Beltsville, Md.

Symposium 8

Sect. Cb. Apiculture
Wednesday, Pan-American Room
Food Gathering Behavior of Hymenoptera. (Part 2). (Co-sponsored by International Union for Study of Social Insects).
Moderator: G. F. TOWNSEND, Dept. of Apiculture, Ontario Agr. Coll., Guelph, Ont.

9:00 313. Food Gathering Behavior of Honey Bees on Forage Crops.
M. V. Smith, Ontario Agr. Coll., Guelph, Ont.

9:36 314. Food Handling by Honey Bees Within the Hive.
R. Boch, Ent. Res. Inst., CDA, Ottawa, Ont.

10:24 315. The Evolutionary Significance of Food Gathering Behavior.
C. D. Michener, Univ. of Kan., Lawrence.

11:00 316. Evaluation of Pollen Collecting Characteristics of Honey Bees.
J. C. M. L'Arrivee, Expt. Farm, Brandon, Man. (Submitted Paper.)
Counts of pollen carriers at colony entrances appear unreliable. Measurements of stored pollen furnished a more satisfactory guide of this behavior.

11:12 317. Vitamin Content of Royal Jelly from Colonies Fed Normal Diets and that of Pollen Substitutes.
H. H. Haydak, Dept. of Ent. and Economic Zool., Univ. of Minn. St. Paul. (Submitted Paper).
Considerable differences were found in the niacin, choline, folic acid, and pyridoxine content of the food of queen larvae reared by experimental colonies fed beebread and pollen substitute, and those produced in outside colonies.

SECTION SYMPOSIA

The following symposia are scheduled by number in center column of the General Program which follows.

Symposium 9

Sect. D. Veterinary and Medical
Wednesday, Normandie Room
Systematics, Biology and Economic Importance of Ceratopogonidae (Part 1).
Moderator: J. A. DOWNES, Ent. Res. Inst., CDA, Ottawa, Ont.

9:00 318. Recent Advances in the Classification of Ceratopogonidae.
W. W. Wirth, ARS, USDA, Washington, D. C.

9:24 319. The Genus *Forcipomyia*, its Biology, Taxonomy and Economic Importance.
L. G. Saunders, Univ. of Saskatchewan, Saskatoon.

9:48 320. Food, Feeding Habits and Other Aspects of the Biology of Adult Ceratopogonidae.
J. A. Downes, Ent. Res. Inst., CDA, Ottawa, Ont.

10:12 321. Field Activity Studies on Adult *Culicoides furens* (Poey).
W. L. Bidlingmayer, Fla. State Board of Health, Vero Beach.

10:36 322. The Ecology of *Culicoides* Larvae, with Special Reference to *Culicoides impunctatus*.
D. S. Kettle, Ministry of Health, Jamaica.

11:00 323. Mass Production Methods for the Colonization of *Culicoides variipennis sonorensis* Wirth and Jones.
R. H. Jones, ARS, USDA, Kerrville, Texas.

11:12 324. A Report on a Study of the Vectors of Bluetongue Disease of Sheep.
R. H. Jones, ARS, USDA, Kerrville, Texas.

11:24 325. *Culicoides* as Intermediate Hosts for *Haemoproteus* and Other Parasites.
A. M. Fallis and G. F. Bennett, Ontario Res. Found., Toronto.

Symposium 10

Sect. F. Chemical Control
Wednesday, Crystal Ballroom
Insecticide Residues: Principles of Research.
Moderator: HENRY HURTIG, Res. Branch, CDA, Ottawa, Ont.

9:00 326. The Present Status of the Residue Problem from the International Standpoint.
H. Hurtig, Res. Branch, CDA, Ottawa, Ont.

9:36 327. Mammalian Toxicology of Insecticide Residues—Safety Evaluation and Interpretation.
B. L. Oser, Food and Drug Res. Lab., Inc., N. Y. City.

10:24 328. Stability of Pesticide Residues in Relation to Plant Protection.
G. C. Decker, Ill. Nat. History Survey, Urbana.

11:00 329. The Role of Inert Residues.
W. Ebeling, Univ. of Cal., Los Angeles.

Symposium 11

Sect. Ab. Teaching
Wednesday, Pan-American Room
Recruiting Entomologists.
Moderators: J. W. MACSWAIN, Univ. of Cal., Berkeley
F. O. MORRISON, Macdonald Coll., Quebec.

1:30 330. What is Good Entomological Training.
S. B. Freeborn, Univ. of Cal., Davis.

1:54 331. School Biology and the Love of Insects.
Brian Hocking, Univ. of Alberta, Edmonton.

2:18 332. Student Transfers to Entomology from Other Biological Fields.
C. D. Michener, Univ. of Kansas, Lawrence.

2:42 333. Recruiting Entomologist: The Employer's Viewpoint.
B. N. Smallman, Research Branch, CDA, Ottawa.

2:54 334. The Value of 4-H Club Program in Entomological Recruiting.
B. B. Pepper, Rutgers Univ., New Brunswick, N. J.

Symposium 12

Sect. Cc. Relations of Insects to Plant Diseases
Wednesday, Parlor H
The Importance of Vector Control.
Moderator: R. H. BRADLEY, Res. Sta., CDA, Fredericton, N. B.

1:30 335. Vectors of Fungus Diseases with Special Reference to Dutch Elm Disease.
J. G. Matthyssee, N. Y. S. Agr. Coll., Cornell Univ., Ithaca.

2:06 336. Vectors of Plant Virus Diseases.
J. N. Simons, Stanford Research Institute, South Pasadena, Calif.

B. B. Pepper, Rutgers Univ., New Brunswick, N. J.

SECTION SYMPOSIA

The following symposia are scheduled by number in center column of the General Program which follows.

Symposium 13

Sect. D. Veterinary and Medical
Wednesday, Normandie Room

Systematics, Biology and Economic Importance of Ceratopogonidae (Part 2).

Moderator: W. W. Wirth, ARS, USDA, Washington, D. C.

8:00 P.M. A Roundtable discussion following the formal presentation of this subject in Symposium 9, Wednesday A.M.

Symposium 14

Sect. B. Physiol. and Toxicol.
Thursday, Grand Ballroom

Insect Feeding.

Moderator: W. Friend, Univ. of Toronto, Toronto, Ont.

9:00–11:12 An open roundtable discussion by the Canadian Insect Physiologists Group based on precirculated papers by invited contributors.

337. Quantitative Dietary Requirements in Insects.
H. L. House, Ent. Res. Inst. for Biol. Control, CDA, Belleville, Ont.

338. The Ethological Interpretation of Researches on Insect Feeding Behavior.
A. J. Thorsteinson, Univ. of Manitoba, Winnipeg.

339. Insect Salivary Fluids.
J. W. McAllan, Res. Sta., CDA, Fredericton, N. B.

340. The Non-feeding Functions of Arthropod Mouthparts.
C. C. Steward, Entomology Laboratory, CDA, Guelph, Ont.

341. The Reactions of the Animal Host to Insect Feeding.
A. S. West, Anne Hudson, Queens Univ., Kingston, Ont., and A. E. R. Downe, Ent. Res. Inst., CDA, Ottawa, Ont.

Symposium 15

Sect. Ea. Extension
Thursday, Parlor H

Training for Extension Service.

Moderator: C. L. Neilson, Prov. Dept. of Agr., Vernon, B. C.

9:00 342. What Special College Training Should Extension Workers Receive?
F. O. Morrison, Dept. Ent., Macdonald Coll., Quebec.

9:24 343. What On-The-Job Training Should Extension Workers Receive?
K. L. Cockerham, La. State Univ., Baton Rouge.

9:48 344. Training County Agents in Handling Local Meetings.
L. E. Adams, Penn. State Univ., University Park.

10:24 345. Visual Aids in Extension Programs.
J. O. Rowell, Va. Poly. Inst., Blacksburg.

Should Extension Workers Be Closely Associated With Research?

10:48 346. 1. Research and Teaching Viewpoint.
A. A. Beaulieu, Ent. Res. Lab., St. Jean, Que.

11:12 347. 2. Research-Extension Liason.
G. F. Manson, Ent. Res. Lab., Chatham, Ont.

11:36 348. 4-H Club Entomology Demonstration.

GENERAL PROGRAM

Monday, Nov. 30

9:00 — **OPENING SESSION—Grand Ballroom**

WELCOME—The Honorable Lewis C. Miriani
Mayor, Detroit, Michigan.
The Honorable Michael J. Patrick
Mayor, Windsor, Ontario.

9:15 — **ANNOUNCEMENTS**

9:30 — **Presidential Addresses:**

The Relation of Insect Taxonomy to Applied Biology.
P. W. Oman, *President*, Entomological Society of America.

Biological Control in Forest Entomology.
M. L. Prebble, *President*, Entomological Society of Canada.

10:10 — **RECESS**

10:20 — **C. V. Riley Memorial Lecture.**

Insect Pathology: Challenge, Achievement and Promise.
E. A. Steinhaus, Department of Biological Control, University of California, Berkeley, Cal.

11:20 — **Preliminary Business Meeting.**

ENTOMOLOGICAL SOCIETY OF AMERICA.
Grand Ballroom
President: P. W. Oman, presiding.

ENTOMOLOGICAL SOCIETY OF CANADA.
Crystal Ballroom.
President: M. L. Prebble, presiding.

12:00 — **NOON RECESS**

1:30 — **PRELIMINARY BUSINESS MEETING, ESA SECTIONS.**

Section A. *General Entomology*
Pan American Room. J. A. Slater, *Chairman*

Section B. *Physiology and Toxicology.*
Grand Ballroom. J. McD. Grayson, *Chairman*

Section C. *Insect Biology.*
English Room. L. S. Janes, *Chairman*

Section D. *Medical and Veterinary Entomology.*
Michigan Room. Herbert Knutson, *Chairman*

Section E. *Control, Extension and Regulatory Entomology.*
Parlor H. R. L. Janes, *Chairman*

Section F. *Chemical Control Investigations.*
Crystal Ballroom. J. B. Moore, *Chairman*

PRELIMINARY BUSINESS MEETING, ENTOMOLOGICAL SOCIETY OF ONTARIO.

Normandie Room. *President:* A. G. McNally, presiding.

Normandie Room. *President:* A. G. McNALLY, presiding.

MONDAY P.M., NOV. 30

C-a. Biological Control Chairman: C. B. Huffaker Reception Room	C-d. Ecology & Bionomics Chairman: G. T. York English Room	Symposia No.	D. Medical and Vet. Chairman: A. W. A. Brown Michigan Room	F. Chemical Control Chairman: H. Hurtig Crystal Ballroom
1:54 1. Stability of Larval Populations of the Eye-Spotted Budmoth, *Spilonota ocellana* (D. & S.), and the Pistol Casebearer, *Coleophora serratella* (L.), from Emergence to Hibernation, on Apple in Quebec. E. J. LeRoux, Res. Lab., CDA, St. Jean, Que. Quantitative estimates of larval populations of the 2 species on McIntosh apple trees in Quebec from 1956 to 1959 revealed no significant changes in mean densities from emergence to hibernation, despite the high number of predatory arthropods and variation in rainfall, temperature and humidity.	**1:54 2. The Limits of Insect Populations. F. R. Lawson, ARS, USDA, Oxford, N. C.** Current theories of population dynamics are inadequate to explain how the extreme limits of some populations are determined. In some cases, these limits may be determined by the supply of critical non-living resources and/or the portion of populations not vulnerable to enemies.	1 2 3	**1:54 3. Needed Standardized Terminology for Arthropod Vector-Host Relationships. D. W. Jenkins, Ent. Div., Fort Detrick, Frederick, Md.**	**1:54 4. Residues from Application of Pesticides to Alfalfa for Spittle Bug Control. J. E. Fahey, Ent. Res. Div., ARS, USDA, Vincennes, Ind., M. C. Wilson, Dept. of Ent., Purdue Univ., Lafayette, Ind., and H. W. Rusk, Ent. Res. Div., ARS, USDA, Vincennes, Ind.** Lindane (.25 lb./A) left no detectable residue in mature alfalfa when applied at 12 inches or as late as 19 days before harvest. BHC (.2 lb. gamma/A) and Thiodan (.25 lb./A) left no residues when applied at 3 and 6 inches of growth but, at 12 inches, residues approximated 0.4 p.p.m.
2:06 5. Predatory Behavior of Some Bee- and Wasp-Killing Robber Flies (Diptera: Asilidae). E. G. Linsley, Univ. of Cal., Berkeley. Comparison of predatory behavior of local representatives of three dominant genera of bee- and wasp-killing asilids in various desert habitats reveals consistent differences in foraging habits and selection of prey. Reasons for these differences are suggested and their possible significance discussed.	**2:06 6. The Effect of Inbreeding and Crossbreeding on Numbers of Insects. Neely Turner, Conn. Agr. Expt. Sta., New Haven.** Reduction in fecundity results from inbreeding. The possibility that inbreeding and crossbreeding may affect the numbers of insects in nature has been considered. Increases in number of progeny of *Oncopeltus fasciatus* Fab. from hybrids of laboratory inbreds, and natural strains from widely separated localities lend support to the hypothesis.	1 2 3	**2:06 7. Problems in Transmission of Ilhéus Virus by *Aedes aegypti* (L.). H. T. Dalmat, Nat. Inst. of Health, Bethesda, Md.** In transmission studies of Ilhéus virus in mice by *A. aegypti* (L.), there was little correlation between mosquito infection rates and transmission rates. Both rates were highest at 32,000 mouse-intracerebral-infective LD_{50} doses per 0.03 ml. of donor blood, and after 7–30 days of incubation in the mosquito.	**2:06 8. Factors Affecting the Epoxidation of Aldrin and Heptachlor in Soils. E. P. Lichtenstein, Dept. of Ent., Univ. of Wis., Madison 6.** Aldrin and heptachlor disappearance and the formation of their epoxides were studied in soils which a) had been autoclaved prior to treatment and b) dried out after treatment. Considerable epoxidation occurred only in a non-autoclaved wet-loam, containing initially 50 times more microorganisms than a sandy soil.
2:18 9. The Distribution of Progeny in Respect to Superparasitism by the Parasite, *Spathimeigenia spinigera* Townsend. H. A. Tripp, Forest Biol. Lab., Quebec, P. Q. Precautions were taken in sampling the hosts to reduce error, while a special technique was employed to identify the parasites. The distributions of the parasite progeny signify that the adults are unable to distinguish between parasitized and unparasitized hosts. Female hosts suffer greater parasitism.	**2:18 10. Immigration as an Additional Factor in the Development of Resistance. F. A. Streams, Dept. of Ent., N. Y. S. Coll. of Agr., Cornell Univ., Ithaca.** Selection was practiced on a polygenic character of *Drosophila*. A population receiving a small proportion of unselected immigrants each generation was superior to a closed population in its response to selection, whereas a population receiving a large proportion of unselected immigrants made only a small advance in response to selection.	1 2 3	**2:18 11. Comments on Certain Factors Affecting Experimental Transmission of *Pasteurella tularensis* (McC. & Chap.) by Species of Ixodid Ticks. C. B. Philip, Rocky Mount. Lab., USPHS, Hamilton, Mont.** Revived interest in tick transmission of *P. tularensis* refocuses attention on inconsistent or conflicting evidence of transovarial passage in, and deleterious effects of the organisms on infected tick hosts. Published and unpublished data bearing on these questions are reviewed.	**2:18 12. The Excretion of Dieldrin, DDT, and Heptachlor Epoxide in Milk of Dairy Cows Fed on Pastures Treated with Dieldrin, DDT, and Heptachlor. Norman Gannon and G. C. Decker, Ill. Nat. Hist. Survey, Urbana.** Dairy cows were turned into pastures treated with dieldrin, DDT and heptachlor at various intervals after treatment and the amount of chemicals appearing in their milk determined frequently thereafter. The results demonstrate the necessity for keeping dairy animals out of treated pastures for recommended intervals.

B & Z Library

C-a. Biological Control Chairman: C. B. Huffaker Reception Room	C-d. Ecology & Bionomics Chairman: G. T. York English Room	Symposia No.	D. Medical and Vet. Chairman: A. W. A. Brown Michigan Room	F. Chemical Control Chairman: H. Hurtig Crystal Ballroom
2:30 13. The Natural Enemies of Three Species of Gall-Making Insects on Hackberry at Ithaca, N. Y. J. C. Moser, USDA, Southern Forest Expt. Sta., Alexandria, La. Galls of two psyllids and one cecidomyiid may occur on a single leaf. Nineteen species of natural enemies were considered: (1) How do the natural enemies of two closely related species of gallmakers differ? (2) How do the natural enemies differ between two groups of gallmakers which are not related?	**2:30 14. Control of Insects through the Spatial Arrangement of Plants. David Pimentel, Dept. of Ent., N. Y. S. Coll. of Agr., Cornell Univ., Ithaca.** The number of insects per unit leaf-surface area was significantly reduced by increasing plant density. Increased plant density also reduced the number of species. Data on the ecology of plant density relative to plant growth, insect parasitism, animal predation, and insect disease are presented.	1 2 3	**2:30 15. Relationships between Ticks and Local and Migrating Birds. Harry Hoogstraal, U. S. Naval Medical Res. Unit No. 3, American Embassy, Cairo, Egypt, U. A. R.** Owing to increasing circumstantial evidence suggesting pathogen dissemination by birds and ectoparasites, tick-bird relations and techniques for studying local and migrant populations are outlined. *Amblyomma* and *Hyalomma* species are widely distributed in Africa, Europe, and Asia by migrant birds.	**2:30 16. The Persistence of Trithion, an Organophosphorus Insecticide, in Several Soils. J. J. Menn, G. H. Batchelder, and G. G. Patchett, Stauffer Chem. Co., Agr. Res. Lab., Mt. View, Cal.** The persistence of Trithion was investigated in several soil types. Trithion residues were determined by means of a cholinesterase inhibition method. In non-sterile soils, Trithion had a half-life of from three to nine months. In sterile soils, the half-life ranged to two years.
2:42 17. Present Status of Parasites of the European Corn Borer, *Pyrausta nubilalis* Hbn., in the United States. G. T. York and S. W. Carter, ARS, USDA, Ankeny, Iowa. *Macrocentrus gifuensis* Ashm. remains the most abundant species in New England, with one positive establishment in Iowa. *Lydella grisescens* R. D. is most abundant species in central corn growing area, but has decreased on eastern seaboard. *Horogenes punctorius* (Roman) is found in a number of areas, increasing appreciably only in Ohio.	**2:42 18. Study of a Bisexual Species of *Pycnoscelus* (Blattaria) Confused with Parthenogenetic *P. surinamensis* (L.). L. M. Roth and E. R. Willis, Central Res. Lab., United Fruit Co., Norwood, Mass.** The reproductive performance of parthenogenetic *P. surinamensis* (L.) from Florida has been compared with that of the bisexual species of *Pycnoscelus* from Hawaii, which also has been called *surinamensis*. The bisexual species cannot reproduce parthenogenetically and is morphologically distinct from the New World *P. surinamensis*.	1 2 3	**2:42 19. Observations on Induced Copulation of *Aedes taeniorhynchus* (Wied.). P. T. M. Lum, Fla. State Board Health, Ent. Res. Center, Vero Beach.** The technique of induced copulation of Aedine mosquitoes (McDaniel and Horsfall, 1957) has proved a valuable tool in studies of this species. Factors influencing insemination were considered.	**2:42 20. Guthion Residues on Concord Grapes. P. R. Sferra, E. F. Taschenberg, and A. W. Avens, N. Y. S. Agr. Expt. Sta., Cornell Univ., Geneva.** Guthion residues were determined during three seasons on samples of Concord grapes. Results were obtained by chemical and biological analyses of surface strippings and total extractions for comparative purposes.
2:54 21. The Influence of the Soldier Fly, *Hermetia illucens* (Linn.), on Populations of House Flies, *M. domestica* L., in Manure under Caged Poultry. W. R. Young and M. Ramirez G. Agr. Program of the Rockefeller Foundation, Mexico 6, D. F. The control of *M. domestica* by *H. illucens* was demonstrated by comparative larval populations of these two species in poultry manure treated with larvacides. Diazinon gave immediate kill of both species but allowed the resurgence of *M. domestica*. In untreated manure, large populations of *H. illucens* eliminated the house fly.	**2:54 22. Survival of the Wheat Stem Sawfly, *Cephus cinctus* Nort., in Wheat Treated with Gibberellic Acid. N. D. Holmes, CDA, Res. Sta., Lethbridge, Alta.** Field-grown spring wheats sprayed with Gibberellic acid were exposed to sawfly infestations. Oviposition sites were affected. Although the percentage solidness of Rescue was reduced, the expected loss in sawfly resistance did not occur. Tests with other wheats show that certain concentrations of Gibberellic acid may strongly inhibit sawfly survival.	1 2 3	**2:54 23. Laboratory Observations on Autogenous *Aedes taeniorhynchus* (Wied.). P. T. M. Lum and A. O. Lea, Jr. Fla. State Board Health, Ent. Res. Center, Vero Beach.** Results of preliminary studies of autogenecity in this species are discussed.	**2:54 24. Measuring the Surface Area of Apples for Expression of Pesticide Residues. R. J. Daum and J. E. Dewey, Dept. of Ent., N. Y. S. Coll. of Agr., Cornell Univ., Ithaca.** In this study, weight and volume displacement data accumulated for several years were supplemented with weight, volume displacement, diameter, and planimeter measurements on two varieties of apples sampled through the season for determination of surface area.

the resurgence of *M. domestica*. In untreated manure, large populations of *H. illucens* eliminated the house fly.

sawfly survival.

MONDAY P.M., NOV. 30

3:06 **RECESS**

C-a. Biological Control Chairman: C. B. Huffaker Reception Room	C-d. Ecology & Bionomics Chairman: G. T. York English Room	Symposia No.	D. Medical and Vet. Chairman: A. W. A. Brown Michigan Room	F. Chemical Control Chairman: H. Hurtig Crystal Ballroom
3:18 25. Investigations with the Fungus *Spicaria rileyi* Farl., and Other Biological Agents Affecting the Cabbage Looper. L. W. Getzin, Texas Agr. Expt. Sta., Weslaco. The virulence and optimum environmental requirements of the fungus were investigated in the laboratory with the cabbage looper as a test insect. Field tests with *S. rileyi*, *Bacillus thuringiensis*, and the Polyhedrosis virus against the cabbage looper were effective in varying degrees.	**3:18 26. Further Investigations on Sex-Ratio and Fertilization in Spider Mites. H. B. Boudreaux, L. S. U., Dept. Zool., Baton Rouge.** The ratio of females to males is correlated with the amount of sperm furnished in a single mating. This supply depends upon the condition of the male and upon the length of time spent in copula. Males labeled with H^3-thymidine were used to investigate the site of fertilization.	1 2 3	**3:18 27. Autogenecity in *Aedes taeniorhynchus* (Wied.) Populations. A. O. Lea, Jr., and P. T. M. Lum, Fla. State Board Health, Ent. Res. Center, Vero Beach.** Samples of this species, taken from various parts of its range, were studied in the laboratory to determine to what extent autogenecity is distributed in wild populations.	**3:18 28. Chemical Residues in Fruits Fumigated at Low Temperatures. T. Dumas and H. A. U. Monro, Pesticide Res. Inst., London, Ont.** Apples, peaches, and plums were fumigated with ethylene dibromide and methyl bromide at temperatures down to 4° C. With reduction in temperature, the combined residue as bromide decreased in fruits treated with methyl bromide. Permanent residues were not detected following ethylene dibromide fumigation. The practical significance of these findings is discussed.
3:30 29. Nematode Associates of the Smaller European Elm Bark Beetle, *Scolytus multistriatus* (Marsh.). J. L. Saunders and D. M. Norris, Jr., Univ. of Wis., Madison 6. Four parasitic and several saprophagous genera of nematodes are associated with *S. multistriatus* in nature. *Tylenchus* sp. was found to be the most prevalent. Successful isolation and rearing of pure colonies of this nematode on an artificial medium have been accomplished. Pathological effects upon the beetles are discussed.	**3:30 30. Qualitative Examinations for Mites on Foliage and Bark of Apple Trees with Three Spray Programs. M. H. Farrier and George Turnipseed, N. C. State Coll., Raleigh.** Foliage and bark of apple trees sprayed with schedules of lead arsenate-DDT, parathion, and malathion were examined at tri-weekly intervals for mites. Phytophagous, predatory, and "free-living" mites on these trees were compared with those on nearby unsprayed trees in western North Carolina.	1 2 3	**3:30 31. Radiation-Induced Mutations in *Aedes aegypti* (L.). R. C. VandeHey and G. B. Craig, Jr., Univ. of Notre Dame, Notre Dame, Ind.** Newly emerged males of *A. aegypti* (L.) were treated with 3000–4000 r from X-rays or gamma radiation. Their progeny were bred to the F_3 generation and examined for inheritable morphologic variation. Nine kinds of visible, viable mutations were isolated and are being maintained.	**3:30 32. Dimethoate for Pea Aphid Control and Chemical Fate on the Pea Plant. J. W. Apple, W. C. Dauterman, and J. E. Casida, Dept. of Ent., Univ. of Wis., Madison 6.** Dimethoate was superior to standard and other candidate insecticides against the pea aphid. Residues were determined for whole plants treated with 0.25 pound per acre. Studies with radioactive dimethoate on and in pea plants showed seven compounds, including dimethoate, its oxygen analog, and five hydrolysis products with phosphoric acid predominating.

C-a. Biological Control
Chairman: C. B. Huffaker
Reception Room

3:42 33. Evidence for a Potent Sex Attractant in the Introduced Pine Sawfly, *Diprion similis* (Htg.) (Hymenoptera: Diprionidae). H. C. Coppel, J. E. Casida, and W. C. Dauterman, Dept. of Ent., Univ. of Wis., Madison 6.

During field investigations on the biological control of the introduced pine sawfly, it was observed that virgin females were capable of attracting large numbers of males. One caged female attracted over 11,000 males. The chemical properties of this attractant were investigated.

3:54 37. Pathogenicity of Three Bacteria to *Scolytus multistriatus* (Marsh.). C. C. Doane, Conn. Agr. Expt. Sta., New Haven.

Serratia marcescens, *Aerobacter scolyti* and *Escherichia klebsiellaeformis* were tested for their pathogenicity to larvae of the smaller European elm bark beetle. *S. marcescens* was isolated from a natural population of the beetle. In laboratory tests, high mortalities from these bacteria were largely dependent on the behavior of the larvae.

4:06 41. *Bacillus thuringiensis* Berliner for Control of the European Corn Borer, *Pyrausta nubilalis* Hbn., in 1959. G. T. York, ARS, USDA, Ankeny, Iowa.

A very low corn borer population caused inconclusive results in field tests. Artificially infested plants showed good kill with repeated applications. One application by airplane gave results comparable to several insecticides.

C-d. Ecology & Bionomics
Chairman: G. T. York
English Room

3:42 34. The Importance of Time of Exposure to Cold in Predicting Mortality of Overwintering Arthropods. A. W. MacPhee, Res. Sta., CDA, Kentville, Nova Scotia.

Laboratory studies on a number of apple orchard arthropods show that the duration of exposure to low temperatures is an important factor in predicting winter mortality and the effect varies widely between species.

3:54 38. Effects of Predaceous Mites of the Family Phytoseiidae and the Phytophagous Mites on Apple Trees. H. J. Herbert, Res. Sta., CDA, Kentville, Nova Scotia.

In 1959, an intensive study was made of the relationships of the phytoseiids and the phytophagous mites *Bryobia arborea* M. & A. and *Panonychus ulmi* (Koch) on apple. A summary of the field methods and the results, using the mathematical model developed by Watt (1959) to interpret the data, are given.

4:06 42. The Effects of Low Dosages of DDT on the Predator Populations of Apple Orchards. F. T. Lord, Res. Sta., CDA, Kentville, Nova Scotia.

The effects of applications of DDT from 8 oz. to 0.5 oz. per 100 gal. on predators were investigated in apple orchards. Some species were tolerant of the 8 oz. rate and others were adversely affected by 0.5 oz. The results of selective elimination of certain species with these amounts are discussed.

Symposia No.

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D. Medical and Vet.
Chairman: A. W. A. Brown
Michigan Room

3:42 35. The Inheritance of Notch Wing in *Aedes aegypti* (L.). G. B. Craig, Jr., and R. C. VandeHey, Univ. of Notre Dame, Notre Dame, Ind.

Mutations resulting in deletions or malformations of the wing membrane have been isolated from at least six separate irradiated lines of *A. aegypti* (L.). Expression is highly variable and the character appears to be semi-dominant with variable and sex-influenced penetrance.

3:54 39. Studies of the Chromosomes of Mosquitoes. O. P. Breland, Dept. of Zool., Univ. of Texas, Austin.

The work to date has emphasized prepupal brain tissue, studied by the so-called squash technique; aceto-orcein is the primary stain that has been used. Techniques are briefly discussed. The chromosome complement and various mitotic stages are illustrated.

4:06 43. Histopathology of a New Ovarian Disorder in *P. americana* (L.). P. F. Bonhag*, Dept. of Ent. & Parasit., Univ. of Cal., Berkeley.

This naturally occurring disorder of the ovary has been found to be widespread in a large stock culture. Many of the follicles contained several oocytes, and vitellogenesis was abnormal. The large follicles at the posterior end of the ovariole were darkly "tanned" and the oocytes degenerate. Adipose tissue also affected.

* Deceased November 1, 1959.

F. Chemical Control
Chairman: H. Hurtig
Crystal Ballroom

3:42 36. Effect of Insecticides on the Beneficial Arthropod Fauna of Sugarcane Fields in Louisiana. S. D. Hensley and W. H. Long, USDA and L. S. U., Baton Rouge.

Heptachlor applied to sugarcane fields for fire ant control caused increases in sugarcane borer infestation, probably by reducing populations of its natural enemies. Endrin applied for borer control caused a reduction of approximately 50 per cent in populations of predatory insect species collected from pitfall traps located on nine plantations.

3:54 40. Effect of DDT Sprays on Aquatic Insects. S. W. Hitchcock, Conn. Agr. Expt. Sta., New Haven.

Four sprayed and one unsprayed streams were sampled before and after DDT was applied by airplane. Little change was noted in the composition of the aquatic insect population. Streams sprayed in previous years still contained a varied insect population, also. Reasons for this are discussed.

4:06 44. Butonate—An Insecticidally Active Phosphonate of Low Mammalian Toxicity. P. H. Derse, Wis. Alumni Res. Foundation, Madison, B. W. Arthur and J. E. Casida, Dept. of Ent., Univ. of Wis., Madison 6.

Earlier evidence of low mammalian toxicity prompted tests for insecticidal activity of o,o-dialkyl alpha-acyloxyethylphosphonates. The outstanding insecticide was o,o-dimethyl 2,2,2-trichloro-1-*n*-butyryloxyethyl phosphonate, designated butonate. The formulated material is active against flies and roaches. Low mammalian toxicity makes it one of the safest insecticides.

* Deceased November 1, 1959.

and roaches. Low mammalian toxicity makes it one of the safest insecticides.

MONDAY P.M., NOV. 30

C-a. Biological Control Chairman: C. B. Huffaker Reception Room	C-d. Ecology & Bionomics Chairman: G. T. York English Room	Symposia No.	D. Medical and Vet. Chairman: A. W. A. Brown Michigan Room	F. Chemical Control Chairman: H. Hurtig Crystal Ballroom
4:18 45. Feeding Layers *Bacillus thuringiensis* Berliner to Control *Musca domestica* L. Developing in Chicken Feces. J. D. Briggs, Ill. Nat. Hist. Survey, Urbana. Daily amounts of 0.5 to 10 gm. of commercially produced *B. thuringiensis* were incorporated into the rations of caged layers. Reductions in the number of emerging house flies ranged from 10% to 90% following 1.0 gm. daily doses. Greater daily amounts of *B. thuringiensis* did not improve control.	**4:18 46. An Ecological Study of Mite Fauna on Apple Foliage. E. R. Oatman, Dept. of Ent., Univ. of Wis., Madison 6.** The populations of phytophagous and predaceous mite species were followed at weekly intervals throughout the 1959 growing season. The studies were conducted in two artificially created environments and in a natural environment of an apple orchard. The species present, population growth, and seasonal distribution are reported.	1	**4:18 47. Compounds Affecting House Fly Metabolism. G. C. LaBrecque, P. H. Adcock, and C. N. Smith, Ent. Res. Div., ARS, USDA, Orlando, Fla.** House flies were exposed to selected compounds in the adult food or larval medium in a search for agents to disrupt metabolism. Five compounds caused adverse non-insecticidal effects. *N*-[*p*-[[2-4-diamino-6-pteridyl-methyl] methylamino] benzoyl] glutamic acid (Methotrexate), sterilized females, but not males, at 0.005% in the adult diet.	**4:18 48. Some New Analogs of Allethrin and Their Toxicity to House Flies. J. Farkaš, Inst. of Chemistry, ČS. Acad. of Sci., Prague, Czechoslovakia, and J. Weiser, Inst. of Biology, ČS. Acad. of Sci., Prague, Czechoslovakia.** Substitution of phelyl, cyclohexyl and other groups for the isobutylen sidechain of the keto-alcohol and for the isobutenyl-group in chrysanthemic acid produced substances comparable in toxic effect to allethrin, furethrin and cyclethrin.
4:30 49. Reduction of House Fly Development in the Feces of Steers Given a Feed Additive of *Bacillus thuringiensis* Berliner. P. H. Dunn, Nutrilite Products, Inc., Buena Park, Cal. A feed additive of *B. thuringiensis* shows promise in control of house flies in bovine feces. At a dosage of 949 x 10^9 spores per animal per day, 95% reduction of adult house fly emergence was shown. Bioassay shows the toxic factor to remain active in dry manure for at least 8 weeks.	**4:30 50. Leafhopper Species Present in Door County, Wisconsin Cherry Orchards. R. F. Brooks and E. R. Oatman, Dept. of Ent., Univ. of Wis., Madison 6.** A leafhopper survey was conducted in Door County, Wisconsin, as a preliminary study on the sour cherry yellows virus-vector project. The species of leafhoppers are reported along with their relative population size and seasonal occurrence. Black light, sticky boards and a sweep-net were the trapping methods used.	1	**4:30 51. Observations of the Swarming Behavior of *Anarete johnsoni* Felt (Cecidomyiidae, Diptera). H. C. Chiang, Dept. of Biol., Univ. of Minn., Duluth.** This midge was attracted to light-colored surfaces. Certain relationships were observed between (1) size of surface, size of swarm and frequency of mating, (2) relative positions of sun, surface and swarm, and (3) distance between and position of two surfaces and distribution of midges.	**4:30 52. The Tarnished Plant Bug, *Lygus lineolaris* (P. de B.), and Birdsfoot Trefoil Seed Production. R. L. Ridgway and G. G. Gyrisco, N. Y. S. Coll. of Agr., Cornell Univ., Ithaca.** Surveys in 1958 and 1959 indicated a sharp increase in the number of tarnished plant bugs in birdsfoot trefoil in late June. Applications of aldrin, parathion, DDT, and toxaphene resulted in significant increases in seed yields of up to 45 per cent.
4:42 53. Laboratory and Field Evaluation of *Bacillus thuringiensis* Berliner for Control of Three Lepidopterous Pests. E. H. Glass, F. L. McEwen, and A. C. Davis. N. Y. S. Agr. Expt. Sta., Cornell Univ., Geneva. Several commercially prepared *B. thuringiensis* formulations were tested in the laboratory against the red-banded leafroller and cabbage looper, and in the field against these species and the imported cabbageworm. Although all three insects could be controlled, there was a vast difference in susceptibility among species.	**4:42 54. A Survey of Predacious Insects in Arkansas Cotton Fields. W. H. Whitcomb and W. P. Boyer, Univ. of Ark., Fayetteville.** Predacious insects were collected from Arkansas cotton fields over a four year period. Sweep net, aerial net, tanglefoot traps and hand collecting were used. These insects were identified and their feeding preferences studied both in field and laboratory. Far more species and families were of importance than formerly realized.		**4:42 55. Clarification of Some Taxonomic Problems in the Genus *Symphoromyia* (Diptera: Rhagionidae). J. G. Chillcott, Ent. Res. Inst., CDA, Ottawa, Ont.** The study of long series of *Symphoromyia* from British Columbia has revealed new characters of leg bristling and genitalic structure for the identification of the common biting species.	**4:42 56. A New Testing Method to Determine the Effectiveness of Residual Insecticides Against the German Cockroach. R. W. Meola and D. M. DeLong, The Ohio State Univ., Dept. of Zool. & Ent., Columbus 10.** A new method of applying insecticides with an electric aerosol generator to various surfaces for residue testing was developed. Test insects were chlordane-resistant and chlordane-susceptible German cockroaches. Data are presented on chlordane and some of the newer organic phosphate compounds.

C-a. Biological Control Chairman: C. B. Huffaker Reception Room	C-d. Ecology & Bionomics Chairman: G. T. York English Room	Symposia No.	D. Medical and Vet. Chairman: A. W. A. Brown Michigan Room	F. Chemical Control Chairman: H. Hurtig Crystal Ballroom
4:54 57. The Compatibility of *Bacillus thuringiensis* Berliner with Insecticides and Fungicides. F. L. McEwen and A. C. Davis, N. Y. S. Agr. Expt. Sta., Cornell Univ., Geneva. *B. thuringiensis* was combined with each of 5 insecticides and 4 fungicides and tested in the field against the cabbage looper. Combinations were tested when freshly prepared and after 3 hrs. standing. In addition to insect control data, plate counts were made to determine whether spore germination was affected.	**4:54 58. Field Tests of Hydrolyzed Proteins as Lures for the Apple Maggot, *Rhagoletis pomonella* (Walsh). W. T. A. Neilson, CDA, Res. Sta., Fredericton, N. B.** Suspensions of acid and enzymatic protein hydrolysates were compared with a standard trapping solution of urea and sodium hydroxide and a control water. Enzymatic soy and casein hydrolysate were the more effective lures. Flies were collected by them from mid-July until early September.		**4:54 59. *Musca autumnalis* Degeer, a New Pest of Livestock in North America. H. J. Teskey, Ent. Lab., Res. Branch, CDA, Guelph, Ontario.** *M. autumnalis* Deg. was reported from Nova Scotia in 1952. It has since been found in Quebec, Ontario, New York, Ohio, Illinois, and Indiana. A decrease in milk production in dairy cattle caused by this fly has been reported from some of these areas. Its taxonomy, world distribution, and life-history are reviewed.	**4:54 60. Recent Studies on Grain Protectants in Mexico. D. Candia Z. and M. Ramirez Genel, Agr. Program of the Rockefeller Foundation, Mexico 6, D. F.** Malathion, lindane, Alodan, DDT and methoxychlor were tested as seed protectants on corn and wheat against *Sitophilus oryza* (L.), *Prostephanus truncatus* (Horm.), *Tribolium confusum* Duv. and *Rhyzopertha dominica* (F.) in the cool central plateau and the tropics of Mexico. Under these conditions, malathion, lindane and Alodan were more effective.
5:06 61. A Bioassay for a Microbial Insecticide Composed of *Bacillus thuringiensis* Berliner Spores. R. C. Maxwell and J. J. Menn, Stauffer Chem. Co., Agr. Res. Lab., Mt. View, Cal. A rapid and simple bioassay was developed for the evaluation of the insecticidal action of Thuricide, a microbial insecticide, composed of *B. thuringiensis* spores. The material was tested on larvae of the diamondback moth, *Plutella maculipennis* (Curt.).	**5:06 62. Application of Sterile Fly Release and Other Radiation Techniques to Tropical Fruit Fly Control, Eradication and Quarantine Problems. L. D. Christenson, L. F. Steiner, J. W. Balock and W. E. Stone, Ent. Res. Div., ARS, USDA, Plant Industry Sta., Beltsville, Md.** Overflooding normal cage populations of tropical fruit flies with sterile flies greatly suppressed fertility, despite frequent mating. Pilot eradication tests with sterile males on isolated Pacific Islands are planned. Irradiation studies with immature fruit flies have suggested quarantine usefulness for an irradiation treatment applied to fresh fruits and vegetables.		**5:06 63. Biology and Control of *Musca autumnalis* Degeer in Ohio. R. E. Treece, G. W. Ware, and A. Ortega, Ohio Agr. Exp. Sta., Wooster.** Laboratory rearing on modifications of house fly media have been successful. Some difficulty was encountered in keeping adults alive in rearing cages. Mating, oviposition, hatch, larval development, and pupation have been observed. Field observations were made on ecology and biology. Control measures have been unsatisfactory.	**5:06 64. Effects of low doses of fumigants on the confused flour beetle, *Tribolium confusum* Duval. S. R. Loschiavo, CDA, Res. Sta., Winnipeg, Man.** Low doses of ethylene dibromide on *T. confusum* Duv. fumigated in a modified Strand flask reduced oviposition of treated females mated with treated or untreated males. Egg hatchability was reduced only when both parents were treated. Mortality was higher in females. Abnormal pupae developed. Susceptibility of eggs increased with age.
5:18 65. Mechanisms and Genetics of Resistance to *Bacillus larvae* White in Honey Bees. W. C. Rothenbuhler, Iowa State Univ. of Science and Tech., Ames. Highly resistant and highly susceptible lines of honey bees have been developed by selection. In these and other lines, three or possibly four different mechanisms of resistance have been detected (hygienic behavior, larval resistance, spore reduction, and protection by adults). A genetic explanation for hygienic behavior has been developed.	**5:18 66. Lure Efficiency and Movement Studies with Tagged Fruit Flies. L. F. Steiner, W. C. Mitchell, J. R. Holloway, and S. Nakagawa, Ent. Res. Div., ARS, USDA, Honolulu 4, Hawaii.** Recoveries revealed flights up to 26 miles over 12 miles of ocean. Up to 55% recovery of released oriental fruit fly males occurred with methyl eugenol. One release of this species spread over an area of 100 sq. miles. Females spread as far as males with heaviest recaptures made downwind.		**5:18 67. The Growth Rate of a Rabbit-Adapted Strain of Body Louse, *Pediculus humanus humanus* L. R. H. Gooding, The Rice Inst., Houston, Texas.** Moults occurred at 5, 9, 13 days with daily feedings (30° C., 75% RH). Population density, fasting of hosts and alternation of hosts did not affect rate of growth. Shorter feeding intervals shortened the time to each moult and increased the number of feedings.	**5:18 68. Repellents for the Smaller European Elm Bark Beetle. J. G. Touhey and D. F. Bray, Univ. of Delaware, Newark.** Repellent properties of 42 compounds were evaluated in feeding-cage tests against the smaller European elm bark beetle, *Scolytus multistriatus* (Marsh). Four of these at 5,000 ppm. combined with DDT at 5,000 ppm. were equal to DDT at 20,000 ppm. in reducing feeding.

tion for hygienic behavior has been developed.

heaviest recaptures made downwind.

MONDAY, P.M. NOV. 30

5:30 **DINNER RECESS**

8:00 **PHOTO SALON**
Grand Ballroom

TUESDAY A.M., DEC. 1

B. Physiol. & Toxicol.
Chairman: R. D. O'Brien
Grand Ballroom

9:00 69. Relation Between Metabolism and Differential Toxicity in Insects and Mice of Acethion, Diazinon, Dimethoate and Parathion. H. R. Krueger, R. D. O'Brien and W. C. Dauterman, Dept. of Ent., Univ. of Wisc., Madison 6.

The persistence of acethion, Diazinon, dimethoate and parathion was studied in the cockroach, house fly and mouse after administration at the same dose. An attempt was made to correlate the metabolism of the phosphorothionate with the selectivity in poisoning.

9:12 73. Metabolism of P^{32}-Labeled Malathion, Diazinon and Methyl Parathion in Normal and Phosphate-Resistant Strains of the House Fly. D. C. Mengle, J. E. Casida and R. D. O'Brien, Dept. of Ent., Univ. of Wisc., Madison 6.

The rate of penetration, hydrolysis and phosphorothionate oxidation was studied *in vivo* for the insecticides in one normal and three resistant strains. An attempt was made to correlate the degree of resistance with the rate of insecticide metabolism and the extent of *in vivo* cholinesterase depression.

C-c. Insects & Plant Diseases
Chairman: G. W. Simpson
Reception Room

9:00 70. Invited Speaker: R. Stace-Smith, Res. Sta., Vancouver, B. C. The Current Status of Bramble Viruses.

9:12 70. R. Stace-Smith, continued.

Symposia No.

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C-d. Ecology & Bionomics
Chairman: R. F. Morris
English Room

9:00 71. Invited Speaker: K. E. F. Watt, Statistical Res. Service, Ottawa, Ont. Mathematical Models In Insect Pest Control.

9:12 71. K. E. F. Watt, continued.

F. Chemical Control
Chairman: J. B. Moore
Crystal Ballroom

9:00 72. Invited Speaker: S. A. Hall, ARS, USDA, Beltsville, Md. Survival of Insecticides.

9:12 72. S. A. Hall, continued.

B. Physiol. & Toxicol.
Chairman: R. D. O'Brien
Grand Ballroom

9:24 74. Further Studies on Metabolism of Cholinesterase Inhibitors. J. E. Casida, Dept. of Ent., Univ. of Wisc., Madison.

Sevin is hydrolyzed more rapidly by plasma albumin than by enzymes in other mammalian tissues. N,N-dimethylcarbamoyl fluoride and diisopropylphosphoryl fluoride are hydrolyzed by the same enzymes of rabbit plasma but by different enzymes of other rabbit tissues. Metabolic reactions resulting in increased anticholinesterase activity of organophosphates and carbamates were studied.

9:36 75. Degradation of Ovex in the American Cockroach. M. H. J. Weiden, Boyce Thompson Inst., Yonkers 3, N. Y., and B. D. Hilton, Dept. of Ent., N. Y. S. Coll. of Agr., Cornell Univ., Ithaca.

In vivo degradation of ovex was followed by analyzing for unmetabolized ovex in treated cockroaches sacrificed over 24 hours. Benzene extracts were cleaned up by Attasol chromatography before analysis of ovex by the amino-antipyrine method. The half-life of a 50 microgram injected dose was six hours.

9:48 77. Study of Dieldrin Metabolism in House Flies. S. C. Chang and C. W. Kearns, Dept. of Ent., Univ. of Ill., Urbana.

Tagged dieldrin was used in a metabolism study in susceptible and resistant house flies. Paper chromatographic separation of the benzene-extracted dose demonstrated only one radioactive spot with identical R_F value of reference dieldrin in three solvent systems. A constant specific activity was shown for three successive crystallizations.

C-c. Insects & Plant Diseases
Chairman: G. W. Simpson
Reception Room

9:24 70. R. Stace-Smith, continued.

9:36 76. Invited Speaker: J. T. Slykhuis, Plant Res. Inst., Ottawa, Ont. The Current Status of Mite-Transmitted Viruses.

9:48 76. J. T. Slykhuis, continued.

Symposia No.

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C-d. Ecology & Bionomics
Chairman: R. F. Morris
English Room

9:24 71. K. E. F. Watt, continued.

9:36 71. K. E. F. Watt, continued.

9:48 78. Invited Speaker: T. A. Bancroft, Iowa State Coll., Ames. Mathematical Models in Experiments and Surveys With the European Corn Borer.

F. Chemical Control
Chairman: J. B. Moore
Crystal Ballroom

9:24 72. S. A. Hall, continued.

9:36 72. S. A. Hall, continued.

9:48 79. Soil Insect Control on Corn in Relation to Placement of Insecticides. J. W. Apple, Dept. of Ent., Univ. of Wisc., Madison 6.

Insecticidal granules in the row were compared with broadcast treatments for the control of northern corn rootworm, wireworms and black cutworm. Special attention was given to the relative value of granular insecticides placed on the soil surface and in soil at different levels above the seed.

TUESDAY A.M., DEC. 1

B. Physiol. & Toxicol.
Chairman: R. D. O'Brien
Grand Ballroom

C-c. Insects & Plant Diseases
Chairman: G. W. Simpson
Reception Room

Symposia No.

C-d. Ecology & Bionomics
Chairman: R. F. Morris
English Room

F. Chemical Control
Chairman: J. B. Moore
Crystal Ballroom

10:00 80. Chemical Properties of a Neuroactive Substance Released During Excessive Nervous Activity. James Sternburg and C. W. Kearns, Univ. of Ill., Urbana.

During excessive nervous activity induced by electrical stimulation or by treatment with certain chlorinated hydrocarbons or by organic phosphates, cockroaches and crayfish release a substance into their blood with pronounced neuroactivity. The known chemical characteristics and reactivity of this substance are summarized.

10:00 76. J. T. Slykhuis, continued.

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10:00 78. T. A. Bancroft, continued.

10:00 81. Absorption of Phorate From Solution "Culture" and Its Effect on Phosphorus Uptake by Cotton Plants. Joseph Hacskaylo, D. A. Lindquist and T. B. Davich, ARS, USDA, Texas Agr. Expt. Sta., College Station.

Absorption of P^{32}-labeled phorate from nutrient solution by cotton plants was linear through 72 hours and proportional to the applied level. Subsequent uptake was inversely correlated with plant content. The absorption of inorganic phosphate was reduced by phorate additions to the solution.

10:12 **RECESS**

10:24 82. Neurophysiological Events During DDT and Organic Phosphate Poisoning. B. E. Brown, James Sternburg and C. W. Kearns, Univ. of Ill., Urbana.

Electrophysiological and enzymatic methods were used to investigate the effects of DDT and certain organophosphates on nervous activity in the cockroach. These are discussed in relation to cholinesterase and the probable significance of a neuroactive substance other than acetylcholine released during nervous activity.

10:24 83. The Six-Spotted Leafhopper, *Macrosteles fascifrons* (Stal.), in Relation to Aster Yellows Virus in Manitoba in 1959. P. H. Westdal, H. P. Richardson and C. F. Barrett, CDA, Res. Sta., Winnipeg, Man.

Studies confirmed windborne spring migration, dispersal from ripening crops, peak concentrations in August and three generations annually. Only the egg overwintered. Less than one per cent of leafhoppers were viruliferous. Aster yellows was generally low but reached 25% on stinkweed and 45% on asters. Dissections showed 40% parasitism.

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10:24 78. T. A. Bancroft, continued.

10:24 84. Absorption of Phorate by Cotton Seeds. D. A. Lindquist, Joseph Hacskaylo and T. B. Davich, ARS, USDA, College Station, Texas.

The uptake of P^{32}-labeled phorate by cotton seeds, following seed treatment, was studied in the laboratory, greenhouse and field. Data are presented on the effect of removing cotton seed hulls prior to treatment and the effect of temperature on phorate uptake by cotton seeds.

TUESDAY A.M., DEC. 1

B. Physiol. & Toxicol.
Chairman: R. D. O'Brien
Grand Ballroom

10:36 85. The Role of Esterases in Electrical Conduction and Toxicity in American Cockroach. E. H. Colhoun, Pesticide Res. Inst., CDA, London, Ont.

Electrical activity of isolated nerve cord was examined following inhibition of acetylcholinesterases and aliphatic esterases. Inhibition of acetylcholinesterases was more important in toxicity than inhibition of aliesterases.

10:48 89. Histochemical Localization of Acid and Alkaline Phosphatases in the Stable Fly Using Napthol AS Phosphates. S. H. Ashrafi and F. W. Fisk, Ohio State Univ., Columbus.

Napthol AS substrates with diazonium salts were incubated with acetone-fixed, paraffin-embedded, sectioned tissues. Acid phosphatases (red dye) were more stable and localized in oviducts, accessory glands, uterus, Malpighian tubules, salivary glands, and rectum. Alkaline phosphatases (blue dye) were found in midgut epithelium, salivary glands, oviducts, and Malpighian tubules.

11:00 92. The Metabolism of Hydrogen Cyanide by *Sitophilus granarius* (L.). E. J. Bond, Pesticide Res. Inst., London, Ont.

The uptake of hydrogen cyanide by this species increased linearly during fumigation even after absorption of a lethal dose. Respiratory inhibition did not appear to be the direct cause of death by this poison. The fate of carbon-14 hydrogen cyanide within the insect was studied.

C-c. Insects & Plant Diseases
Chairman: G. W. Simpson
Reception Room

Symposia No.

10:36 86. Greenbug Migration and Distribution of Virus in Wisconsin. J. T. Medler, Dept. of Ent., Univ. of Wisc., Madison 6, and P. W. Smith, Wisc. Dept. of Agr., Madison 3.

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Yellow pan traps were used in Missouri, Kansas and Wisconsin to study the northward migration of the greenbug. Migrants that arrived in Wisconsin introduced a virus disease of oats. Chemical control measures used against the greenbug when populations became abundant were ineffective because of virus already spread in the crop.

10:48 90. Bimodal Transmission of Cabbage Virus B by the Cabbage Aphid. R. B. Chalfant and R. K. Chapman, Dept. of Ent., Univ. of Wisc., Madison 6.

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Tests with varying lengths of acquisition feeding, persistence of virus in the aphids, and the use of virus inhibitors on the aphid stylets, have shown that the cabbage aphid transmits cabbage virus B in a nonpersistent manner following short acquisition feeds and in a semipersistent way after long acquisition feeds.

11:00 93. Green Peach Aphid and Virus Yellows of Beet in Desert Southern California. R. C. Dickson, Citrus Exp. Sta., Riverside, Calif.

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Green peach aphid populations appear each winter by re-entry of the species into the desert. The incidence of alatae is then determined by the size of the colonies on the beet plants. Yellows infection occurs late on large plants.

C-d. Ecology & Bionomics
Chairman: R. F. Morris
English Room

10:36 87. Invited Speaker: Fred Smith, Univ. of Mich., Ann Arbor. Life Table Techniques in Population Ecology.

10:48 87. Fred Smith, continued.

11:00 87. Fred Smith, continued.

F. Chemical Control
Chairman: J. B. M' ore
Crystal Ballroom

10:36 88. Broadcast Treatment of Granular Phorate for European Pine Shoot Moth Control. D. E. Donley, Forest Insect Lab., Central States Forest Expt. Sta., Columbus, O.

A twenty-acre red pine—European larch plantation was treated with two pounds actual phorate per acre using a helicopter in late April 1958 for control of the European pine shoot moth. Excellent results in terms of shoot moth control were obtained, but bioassay of associated plants indicated undesirable residues.

10:48 91. The Effects of Insecticide, Fungicide, Fertilizer-Combinations on the Development of Sugar Beets. J. T. Schulz and J. A. Onsager, N. Dak. Agr. Expt. Sta., Fargo.

Following the utilization of organic insecticides for sugar-beet root maggot control, varying degrees of decreased beet germination and yields were noted. These can be attributed to interactions of the insecticides with the fungicides and fertilizers employed, and the manner of application of each.

11:00 94. Effect of Insecticide-Fertilizer Mixtures and Seed Treatments on Emergence of Sugar Beet Seedlings. W. R. Allen, CDA, Res. Sta., Winnipeg, Manitoba.

The effect on seedling emergence of formulations applied at seeding for sugar-beet root maggot control was observed. Fertilizer mixtures were prepared using 11–48–0, insecticides and solvents. Insecticides and particularly solvents that strongly inhibit root growth decreased emergence. At low levels of soil moisture, fertilizer was found to be more important.

root growth decreased emergence. At low levels of soil moisture, fertilizer was found to be more important.

TUESDAY A.M., DEC. 1

B. Physiol. & Toxicol.
Chairman: R. D. O'Brien
Grand Ballroom

11:12 95. Toxicity Studies of Some Proteolytic Enzymes to the House Fly. N. G. Patel, L. K. Cutkomp and T. A. Gochnauer, Dept. of Ent. and Econ. Zool., Univ. of Minn., St. Paul 1.

One of the 3 proteolytic enzymes from American foulbrood diseases of honey bee caused by *Bacillus larvae* (White) was found toxic to various species of insects. Toxicity responses of house fly are reported in relation to differences in age, sex, strains and temperature. Probable detoxification mechanism following feeding is discussed.

11:24 99. Mechanism of "Potentiation" of the Toxicity of Malathion and Related Compounds by EPN. R. D. O'Brien, J. B. Knaak and F. W. Seume, Pesticide Res. Inst., London, Ont., and Univ. of Wisc., Madison 6.

Malathion metabolism by rat tissue preparations and by intact rats and dogs is modified by EPN, resulting in elevated tissue levels of malathion, but not of malaoxon. The toxicity of all phosphorothionates so far studied which contain carboxyester or carboxyamide groups is potentiated by EPN.

11:36 103. The "Shock Dose" of DDVP in Warm-Blooded Animals. R. L. Tracy, Norda Essential Oil and Chemical Co. Inc., 601 West 26 St., N. Y. 1.

When DDVP was administered orally to milch cows and white female rats, in doses equivalent to about one-half their LD_{50} dose, the animals collapsed with typical symptoms of organic phosphate poisoning. The period of "shock" varied between 1 and 5 hours, and was followed by complete recovery.

C-c. Insects & Plant Diseases
Chairman: G. W. Simpson
Reception Room

11:12 96. Maple Blight, A New Disease of Sugar Maple in the Lake States. D. M. Benjamin and R. L. Giese, Dept. of Ent., Univ. of Wisc., Madison 6.

Maple blight which kills terminal shoots and branches, and causes epicormic sprouting at the branch, bases of the branchlets and along the main trunk often kills the entire tree. Saplings to mature trees are affected. Epizootics of defoliating insects appear involved.

11:24 100. The Leafroller-Webworm Complex Associated with Maple Blight. R. L. Giese and D. M. Benjamin, Dept. of Ent., Univ. of Wisc., Madison 6.

Two leaf rollers of sugar maple, *Sparganothus acerivorana* MacKay and *Acleris chalybeana* Fern., and a webworm, *Tetralopha asperatella* (Clem.), that is dependent upon the former two species for oviposition sites are discussed. The interrelationships of these species and their influence in the maple blight problem are analyzed.

11:36 104. The Impact of Defoliation in the Maple Blight Problem. J. E. Kapler, Dept. of Biology, Loras Coll., Dubuque, Iowa, R. L. Giese and D. M. Benjamin, Dept. of Ent., Univ. of Wisc., Madison 6.

Simulative weekly defoliation of sugar maple timed to coincide with leafroller and webworm attack is reflected in die back, epicormic sprouting and death of trees similar in appearance to that caused by maple blight. Comparable symptoms followed leaf roller—webworm and saddled prominent epizootics.

Symposia No. 6

C-d. Ecology & Bionomics
Chairman: R. F. Morris
English Room

11:12 97. Predictability of Corn Earworm Occurrence in the Hudson River Valley as Related to Seasonal Temperatures. J. A. Adams, N. Y. S. Agr. Expt. Sta., Cornell Univ., Geneva.

Several years' experience with weekly black-light trapping and degree-days summation has been summarized. In the northern climate, temperatures in spring seem relevant to seasonal brood timing while temperatures in summer seem relevant to larval abundance in summer and fall.

11:24 101. Observations on the Deposition of *Heliothis* Eggs on Corn Silks and the Effects of Predators on Egg Mortality. F. P. Harrison, Univ. of Maryland, College Park.

Throughout the season of 1959, observations were made on five plantings of sweet corn in order to: determine the seasonal fluctuations of earworm oviposition; determine the presence of predacious insects that frequent corn silks; determine quantitatively and qualitatively the effects of these predators on earworm egg mortality.

11:36 105. Transmission and Movement of Sperm in the Reproductive Tract of the Corn Earworm, *Heliothis zea* (Boddie). P. S. Callahan, Dept. of Ent., L. S. U., Baton Rouge.

The transmission and movement of sperm through the reproductive tracts of male and female *H. zea* is traced and the functions of the various reproductive organs concerned with the movement and storage of sperm are described.

F. Chemical Control
Chairman: J. B. Moore
Crystal Ballroom

11:12 98. The Effect of Seed Treatments With Phorate and Other Systemic Insecticides on the Germination of Wheat. R. E. Kirk, Purdue Univ. Agr. Expt. Sta., Lafayette, Ind.

Greenhouse studies were conducted to find a method to apply phorate to wheat seed without reducing germination. Certain sticker and fungicide combinations when used with phorate greatly reduced its toxicity to the seed. None of the combination treatments eliminated the problem entirely.

11:24 102. The Use of Phorate to Control Aphids and the Hessian Fly on Wheat. M. C. Wilson, H. F. Hodges, R. L. Gallun and R. E. Kirk, Purdue Univ. and Ent. Res. Div., USDA, Lafayette, Ind.

Phorate as a seed treatment in the fall and as a granular treatment in the spring was tested against the hessian fly and aphids infesting winter wheat. All treatments controlled both insects, and highly significant increases in yields were obtained.

11:36 106. Toxicity of Phorate and Other Systemic Insecticides to the Hessian Fly, *Phytophaga destructor* (Say). M. C. Wilson, R. L. Gallun and R. E. Kirk, Purdue Univ. and Ent. Res. Div., USDA, Lafayette, Ind.

Laboratory studies were conducted to determine the toxicity of phorate and other systemic insecticides to the larvae of the hessian fly. The insect was very sensitive to low dosages of phorate. Phorate was more toxic than Di-Syston. Experimental compound SD 3562 was not effective at rates tested.

TUESDAY A.M., DEC. 1

B. Physiol. & Toxicol.
Chairman: R. D. O'Brien
Grand Ballroom

11:48 107. Nucleotide Dephosphorylation by Sarcosomes from the American Cockroach. D. G. Cochran, Dept. of Ent., V. P. I., Blacksburg.

Breakdown of adenosine and inosine nucleotides by isolated mitochondria from thoracic muscles has been investigated. All three phosphate groups are removed from ATP and ITP. The mechanism of dephosphorylation and influence of bivalent cations have been studied. The significance of an "AMP ase" is discussed.

C-c. Insects & Plant Diseases
Chairman: G. W. Simpson
Reception Room

Symposia No.

11:48 108. The Relation of the Maggot to the Incidence of Soft Rot in Some Cruciferous Crops in Wisconsin. J. F. Doane and R. K. Chapman, Univ. of Wisc., Madison 6.

A study was conducted to determine the relationship of the various stages of the cabbage maggot to the incidence of rot in crucifers. Bacterial isolates were obtained from eggs, larvae, puparia and newly emerged adults. Bacteria which caused decay of crucifers were not essential for the development of the maggot.

C-d. Ecology & Bionomics
Chairman: R. F. Morris
English Room

11:48 109. Collecting Insects in Traps Using Battery-Powered 4-, 6- and 15-Watt Blacklight. P. W. Smith, Wisc. Dept. of Agr., J. W. Apple, J. T. Medler and W. C. Zarnstorff, Univ. of Wisc., Madison 6.

Except for lamp differences, six identical traps were alternated between corn and alfalfa. Very satisfactory catches were obtained for all wattages. The experiment showed that these traps can be used to collect insects where conventional 110-volt power sources are not available.

F. Chemical Control
Chairman: J. B. Moore
Crystal Ballroom

11:48 110. The Effect of Soil Type and Moisture on the Germination of Wheat Seed Treated with Phorate. R. E. Kirk and M. C. Wilson, Purdue Univ. Agr. Expt. Sta., Lafayette, Ind.

Phorate-treated wheat seed was planted in the greenhouse in six soils under conditions of minimum, adequate and excess moisture. Germination was greatly reduced under excessive moisture conditions and to a lesser extent with minimum moisture. Unfavorable growing conditions tended to increase phytotoxicity of the insecticide.

NOON RECESS

1:30-5:00 PLENARY SYMPOSIUM: BIOLOGICAL ALTERNATIVES TO CHEMICAL CONTROL.
Moderator: **E. A. Steinhaus, Department of Biological Control, University of California, Berkeley, California.**

Successes, Failures and Prospects for Control with Insect Parasites and Predators.
F. J. Simmonds, Commonwealth Institute of Biological Control, Ottawa, Ontario, Canada.
The Bacteriological Control of Insects.
T. A. Angus, Insect Pathology Research Institute, Canadian Department of Agriculture, Sault Ste. Marie, Ontario, Canada.
Insect Viruses.
C. G. Thompson, Agricultural Research Service, United States Department of Agriculture, Beltsville, Maryland.
Fungi, Nematodes and Protozoa as Control Agents.
I. M. Hall, Department of Biological Control, University of California, Riverside, California.
Utilization of Plant Resistance to Insects.
R. H. Painter, Department of Entomology, Kansas State University, Manhattan, Kansas.
Genetic and Physiological Methods of Biological Control.
E. O. Wilson, Biological Laboratories, Harvard University, Cambridge, Massachusetts.

5:30–7:00 **ENTOMOLOGISTS' MIXER**
Crystal Ballroom

7:30 **BANQUET**
Grand Ballroom

WEDNESDAY A.M., DEC. 2

A. General Entomology Chairman: J. A. Slater Michigan Room	B. Physiol. & Toxicol. Chairman: J. McD. Grayson Grand Ballroom	Symposia No.	C-d. Ecology & Bionomics Chairman: G. T. York Reception Room	E-b. Plant Pest Control & Quar. Chairmen: K. Dorward & N. P. Beaudoin Parlor H
9:00 111. Thomas Say's Poorly Known Collecting Trip to the Eastern Shores of Maryland and Virginia. A. B. Gurney, Ent. Res. Div., USDA, Washington 25, D. C. Say evidently visited Assateague and Chincoteague Islands in September–October, 1817, not 1824 as previously suggested. About 23 insects and millipedes were described, including *Anopheles punctipennis* and *Blissus leucopterus*. Several localities mentioned cannot be located readily on modern maps. In cases of taxonomic confusion, topotypes may be important.	**9:00 112. The Effect of DDT on Free Amino Acids in the Tissues of Susceptible and DDT-Resistant *Aedes aegypti* (L.) Larvae. D. W. Micks and Martha J. Ferguson, Lab. of Med. Ent., Univ. of Texas, Galveston.** When larvae of DDT-resistant and susceptible strains were exposed to their respective LC_{50}'s for DDT for up to 16 hours, chromatographic analysis revealed that alanine was the principal amino acid affected. The alanine level in the resistant strain increased while that of the susceptible strain showed no significant change.	7 8 9 10	**9:00 113. Life History of the Pinyon Needle Scale, *Matsucoccus acalyptus* Herbert, and Some Control Possibilities. W. F. McCambridge, Rocky Mt. Forest & Range Expt. Sta., Albuquerque, N. M.** *M. acalyptus* is a serious pest of pinyon pine. For many years, lack of adequate knowledge of the scale made control efforts unsatisfactory. Recent determination of the life history of the scale and limited control experiments give promise of satisfactory protection in the future.	**9:00 114. Invited Speaker: H. E. Gray, Board of Grain Commissioners, Ottawa, Ont. Activities of Board of Grain Commissioners and Its Relation to Phytosanitary Measures.**
9:12 115. The Distribution of Zoraptera. G. T. Riegel, Eastern Ill. Univ., Charleston. The known distribution of *Zorotypus hubbardi* Caudell has been greatly expanded in recent years. Originally thought restricted to subtropical areas, colonies are found north to Iowa and Pennsylvania where they overwinter in decaying sawdust piles. New collections have added records in several states at the periphery of the known range.	**9:12 116. Toxicity of Several Carbamate Insecticides Toward Susceptible and DDT-Resistant Mosquitoes, *Culex quinquefasciatus* Say. S. M. Hassan and W. M. Hoskins, Dept. of Ent. and Parasit., Univ. of Cal., Berkeley.** Several carbamate insecticides were evaluated against larvae and adults. Each material was tested alone and in combination with others at levels lower than the LC 50. Analog synergism was shown clearly between certain pairs of carbamates, e.g., LD O (Sevin) plus LD 5 (Dimetan) gave 64 per cent mortality of larvae.	7 8 9 10	**9:12 117. Biology of *Ips lecontei* in Ponderosa Pine. H. E. Ostmark, Rocky Mt. Forest & Range Expt. Sta., Albuquerque, N. M.** *I. lecontei* is a primary insect pest of ponderosa pine in Arizona and New Mexico, preferring small diameter trees. It has four generations per year not including re-emergence of parent adults.	**9:12 114. H. E. Gray, continued.**
9:24 118. Distribution Patterns of New World Odonata. B. E. Montgomery, Purdue Univ., Lafayette, Ind. Distribution patterns of Calopterygoidea, Lestoidea and certain subfamilies and genera of other families have been prepared from a manuscript catalog of New World species. Patterns varied widely from genera of numerous species of limited distribution to those of few species of cosmopolitan range.	**9:24 119. The Metabolism of C^{14}-Sevin by Susceptible and Parathion-Resistant House Flies. M. E. Eldefrawi and W. M. Hoskins, Dept. of Ent. and Parasit., Univ. of Cal., Berkeley.** Topical application of C^{14}-Sevin results in rapid absorption and excretion. By use of paper chromatography and paper electrophoresis, at least three metabolites are demonstrated in both tissues and excreta after four hours. Susceptible and resistant strains show differences in amount and proportion of the metabolites.	7 8 9 10	**9:24 120. Second Diapause in Spruce Budworm Populations. G. T. Harvey, Forest Insect Lab., Sault Ste. Marie, Ont.** One mountain sub-species of spruce budworm has a second diapause not found normally in other sub-species. Length of photoperiod during rearing prevents some second diapause in this sub-species or induces it in others. Studies of these effects further our understanding of the interrelationships between the sub-species.	**9:24 121. Invited Speaker: H. A. U. Monro, Pesticide Res. Inst., London, Ont. Fumigation as an Instrument of Plant Quarantine: Biological and Physio-Chemical Problems.**

WEDNESDAY A.M., DEC. 2

A. General Entomology Chairman: J. A. Slater Michigan Room	B. Physiol. & Toxicol. Chairman: J. McD. Grayson Grand Ballroom	Symposia No.	C-d. Ecology & Bionomics Chairman: G. T. York Reception Room	E-b. Plant Pest Control & Quar. Chairmen: K. Dorward & N. P. Beaudoin Parlor H
9:36 122. Faunal Affinities of Jamaican Pselaphid Beetles. Orlando Park, Dept. Biol. Sci., Northwestern Univ., Evanston, Ill. Ninety species of Pselaphidae are known from the West Indies. The pselaphid fauna of Jamaica has a preponderance of its affinities with southern Mexico and northern Central America.	**9:36 123. Fate of DDT and Toxaphene Applied Topically to Susceptible and Resistant Boll Weevils. D. A. Lindquist, J. R. Brazzel, and T. B. Davich, USDA, ARS, and Texas Agr. Expt. Sta., College Station.** The fate of DDT, alone and in combination with toxaphene, applied to susceptible and resistant boll weevils has been studied. Toxaphene appears to have little effect on the absorption and metabolism of DDT. Data also are presented on the absorption of toxaphene by boll weevils.	7 8 9 10	**9:36 124. Mortality Factors Associated with the Decline of a Spruce Budworm Outbreak in the Lower St. Lawrence and Gaspe Peninsula. J. R. Blais, Forest Biol. Lab., CDA, Laval Univ., Quebec, P. Q.** In the course of biological studies associated with the aerial spraying program against the spruce budworm in the Lower St. Lawrence and Gaspe Peninsula between 1954 and 1958, observations were made on the influence of a number of natural control factors on population fluctuations of this insect, especially during the last years of the outbreak.	**9:36 121. H. A. U. Monro, continued.**
9:48 125. Observations on the Systematics of the Strawberry Aphid (*Pentatrichopus* spp.) Complex. G. A. Schaefers, N. Y. S. Agr. Expt. Sta., Cornell Univ., Geneva. Samples of adult apterous viviparae from many areas were observed for variation in abdominal chaetotaxy. Three species from the western U. S. are morphologically distinct. In the eastern U. S., there is a replacement of one species and a greater amount of variation in setal patterns.	**9:48 126. Effectiveness of Chlorinated Hydrocarbon Insecticide Mixtures for Control of Resistant Boll Weevils. J. R. Brazzel and D. A. Lindquist, Texas Agr. Expt. Sta., USDA, ARS, College Station.** The effectiveness of combinations of toxaphene-DDT was studied in the laboratory. The addition of DDT to toxaphene increased its toxicity to susceptible weevils slightly but synergistic effects were evident when the mixtures were applied to the resistant strain.	7 8 9 10	**9:48 127. Some Environmental Factors Controlling the Flight of the Engelmann Spruce Beetle. J. F. Chansler, School of Natural Resources, Univ. of Mich., Ann Arbor.** Brood beetles may leave their hibernation chambers in the bark, in May and June, and start their flights to host trees at lower temperatures than the specimens tested on flight mills. Light appears to have little or no effect on flight performance.	**9:48 128. Invited Speaker: F. A. Soraci, N. J. Dept. of Agr., Trenton. States Interests in the Regulatory Programs.**
10:00 129. The Two American Species of *Cissites* (Coleoptera, Melcidae). J. W. Mac Swain, Dept. of Ent. & Parasit., Univ. of Cal., Berkeley. A comparison is made of the distribution, morphological variability and host associations between larval and adult specimens of the two species of *Cissites* known to occur in North and South America.	**10:00 130. Genetic Basis for Resistance in the Boll Weevil to Chlorinated Hydrocarbon Insecticides. C. B. Bragassa, J. R. Brazzel, and J. C. Gaines, Texas Agr. Expt. Sta., College Station.** Heritability of resistance to endrin in the boll weevil, *Anthonomus gandis* Boh., was demonstrated in the laboratory. Reciprocal crosses of resistant and susceptible lines were made. The level of resistance in the first and second generations was determined for endrin.	7 8 9 10	**10:00 131. Studies of the Balsam Woolly Aphid in North Carolina. R. J. Kowal, USDA, Forest Service, Southeastern Forest Expt. Sta., Asheville, N. C.** The outbreak which killed over 20,000 Fraser fir trees since 1957 is being studied. Insecticide tests to control the aphid in scenic areas indicate that emulsifiable oils are effective. Preliminary tests with systemics yielded no promising results. In a biological control study, adults of *Laricobius* and *Aphidoletes* were liberated.	**10:00 128. F. A. Soraci, continued.**

endrin.

and *Aphidoletes* were liberated.

WEDNESDAY A.M., DEC. 2

10:12 **RECESS**

A. General Entomology Chairman: J. A. Slater Michigan Room	B. Physiol. & Toxicol. Chairman: J. McD. Grayson Grand Ballroom	Symposia No.	C-d. Ecology & Bionomics Chairman: G. T. York Reception Room	E-b. Plant Pest Control & Quar. Chairmen: K. Dorward & N. P. Beaudoin Parlor H
10:24 132. A tentative Systematic Reorganization of the Ant Genus *Pogonomyrmex* Mayr in North America. A. C. Cole, Univ. of Tenn., Knoxville. Collections and analytical studies of the ant genus *Pogonomyrmex* in the U. S. and Mexico during a five-year period have pointed to certain tentative conclusions concerning a definition of the complexes and their composition. From these have resulted a reorganization, synonymy, and the addition of two probable new species.	**10:24 133. Laboratory Selection of the German Cockroach for Resistance to Malathion and Diazinon. J. McD. Grayson, Dept. of Ent., V. P. I., Blacksburg.** Nymphs of chlordane-resistant and normal strains were exposed to surfaces treated with malathion and Diazinon to give > 50% kill in parental, F_1 and F_2 generations; > 65% kill in the F_3 and F_4; and > 80% kill in subsequent generations. Shifts in populations were evident after 4 or 5 generations.	7 8 9 10	**10:24 134. The Jack-Pine Budworm, *Choristoneura pinus* Free., as a Pest of Other Conifers with Special Reference to Red Pine. H. M. Kulman, Dept. of Plant Path., Bact. and Ent., W. Va. Univ., Morgantown, and A. C. Hodson, Dept. of Ent. and Econ. Zool., Univ. of Minn., St. Paul 1.** The jack-pine budworm is an incidental pest of eastern larch. In several Minnesota locations, jack-pine budworm defoliation has caused top killing in overstory and understory red pine in jack pine stands. The 1958 terminal growth of understory red pine has been correlated with varying degrees of 1957 defoliation.	**10:24 135. Invited Speaker: W. N. Keenan, Plant Protection Div., Ottawa, Ont. Plant Pest Control and Regulatory Programs, Canada.**
10:36 136. The Genera of Otitidae Occurring in America North of Mexico (Diptera, Acalyptratae). G. C. Steyskal, 27253 West River Road, Grosse Ile, Mich. A key to the genera is presented and distinctions are cited to separate the Richardiidae as a distinct family. Two subfamilies, Platystominae and Otitinae, are recognized, the latter with two tribes, Ulidiini and Otitini. Three new genera are proposed.	**10:36 137. Resistance to DDT and Chlordane in the German Cockroach Following Discontinuance and Restoration of Selection. J. McD. Grayson, Dept. of Ent., V. P. I., Blacksburg.** Discontinuance of selection resulted in initial apparent rise in resistance in both strains, followed by rapid loss of resistance after third generation in DDT strain, but slow, gradual loss in chlordane strain. Restoration of selection resulted in rapid increase in resistance in chlordane strain but slow increase in DDT strain.	7 8 9 10	**10:36 138. Biology of *Swammerdamia lutarea* (Haw.), a Pest New to North America. R. F. Morris, Expt. Farm, Res. Branch, CDA, St. John's West, Nfld.** *S. lutarea* was first observed in Newfoundland in 1954 and is now a serious pest of hawthorne hedges and trees. The life history was studied in detail.	**10:36 135. W. N. Keenan, continued.**

A. General Entomology Chairman: J. A. Slater Michigan Room	B. Physiol. & Toxicol. Chairman: J. McD. Grayson Grand Ballroom	Symposia No.	C-d. Ecology & Bionomics Chairman: G. T. York Reception Room	E-b. Plant Pest Control & Quar. Chairmen: K. Dorward & N. P. Beaudoin Parlor H
10:48 139. Variations in *Tabanus* (*Hybomitra*) *frontalis* Walker in North America. J. F. McAlpine, Ent. Res. Inst., CDA, Ottawa, Ont. Variations in Nearctic *T. frontalis* Wlk. are described and evaluated. Two subspecies are recognized, one existing as a broad cline in the boreal region and another occupying the ecotone between the grassland and boreal regions. Evidence of hybridization between British Columbia populations of *T. frontalis* and *T. opocus* Coq. is presented.	**10:48 140. Cross Resistance in a Diazinon-Resistant Strain of *Musca domestica* L. A. J. Forgash and E. J. Hansens, Dept. of Ent., Rutgers Univ., New Brunswick, N. J.** The toxicity of various insecticides to a resistant strain of house fly, which had been subjected to continued selection with Diazinon, was measured by topical application. Cross-resistance was exhibited toward 19 different materials.	7 8 9 10	**10:48 141. The Role of Red Oak Borer in the Hardwood Borer Problem. C. J. Hay, U. S. Forest Service, Central States Forest Expt. Sta., Div. of Forest Insect Res., Columbus, O.** Studies on a sawmill and on established woodland plots supported the following results. The red oak borer, *Romaleum rufulum*, is the primary woodborer in upland oak type in eastern Kentucky. Other species formerly considered of greater importance are secondary. Natural control of red oak borer is most effectively performed by nitidulids.	**10:48 142. Invited Speaker: W. L. Popham, Crops Regulatory Program, USDA, Washington, D. C. Plant Pest Control and Regulatory Programs, United States.**
11:00 143. Clinal Intraspecific Variation in Certain Tenebrionidae. C. A. Triplehorn, Ohio Agr. Expt. Sta., Wooster. Pronotal coloration in *Neomida biconnis* (F.), elytral color pattern in *Diaperis maculata* (Oliv.), and the width of the ventral intraocular space in *Platydema excavatum* Say and *P. nigratum* (Mots.), all were found to vary clinally from north to south. Recognition of these character gradients has clarified the status of these widespread species.	**11:00 144. The Influence of Selection Pressure on the "Quality" of Resistance in the Two-Spotted Mite, *Tetranychus telarius* L. D. L. Watson, Cal. Spray Chem. Co., Moorestown, N. J., C. O. Hansen, Davey Tree Expert Co., Kent, Ohio, and J. A. Naegele, Dept. of Ent., N. Y. S. Coll. of Agr., Cornell Univ., Ithaca.** Several population characteristics other than resistance levels and rate of resistance development were investigated in two resistant strains with reference to the selection pressure used to develop these strains. No consistent differences in the characteristics investigated were found referable to selection pressure.	7 8 9 10	**11:00 145. Biology of the Oak Timberworm in Missouri. W. D. Buchanan, U. S. Forest Service, Univ. of Missouri, Columbia.** In Missouri, the oak timberworm, *Arrhenodes minutus* (Drury), usually develops in living trees and completes its life cycle in 3 years. Trees were attacked only through wounds exposing bare wood. Larval galleries degrade or destroy the value of products obtained from infested trees.	**11:00 142. W. L. Popham, continued.**
11:12 146. The Evolutionary Relationships of 17-Year and 13-Year Cicadas. R. D. Alexander and T. E. Moore, Univ. of Mich., Museum of Zool., Ann Arbor. Six species of periodical cicadas, three with 17-year life cycles and three with 13-year life cycles, occur. Each 17-year species has a sibling with a 13-year cycle. Variations in distribution and abundance are cited and attempts made to give geographic and temporal significance to an hypothesis for their evolutionary relationships.	**11:12 147. Cross Resistance Induction in the Two-Spotted Mite, *Tetranychus telarius* L. C. O. Hansen, Davey Tree Expert Co., Kent, Ohio, and J. A. Naegele, Dept. of Ent., N. Y. S. Coll. of Agr., Cornell Univ., Ithaca.** Samples of mites from a "non-resistant" colony of two-spotted mites were selected for resistance to each of six acaricides. After selection, each selected strain and the control (unselected) strain were tested with each of these six acaricides. The cross resistance patterns thus established provide opportunity for speculation.	7 8 9 10	**11:12 148. Interpreting Biology of the Ambrosia Beetle, *Trypolendron*, on the Basis of Internal Organs. J. A. Chapman, Forest Biol. Lab., Res. Branch, CDA, Victoria, B. C.** Internal organs were observed throughout adult life. Changes in flight muscle and ovaries usually occur together and appear independent of fat body and digestive system changes. Relationships of behavior to internal conditions are noted. A marked difference occurs in fat body metabolism of active and diapausing beetles.	

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sistance patterns thus established provide opportunity for speculation.

WEDNESDAY A.M., DEC. 2

A. General Entomology
Chairman: J. A. Slater
Michigan Room

11:24 149. Unusual Pupal Mandibles in the Caddisfly Family Phryganeidae (Trichoptera). G. B. Wiggins, Royal Ontario Museum, Toronto 5, Ont.

Although the pupal mandibles of almost all caddisflies are well developed and heavily sclerotized, there are some thirty species in the family Phryganeidae in which the pupal mandibles are reduced to soft membranous lobes. Associated with these unusual mandibles is a significant change in the structure of the pupal case.

B. Physiol. & Toxicol.
Chairman: J. McD. Grayson
Grand Ballroom

11:24 150. A New Class of Cyclic Phosphate Insecticides. H. H. Moorefield, Boyce Thompson Inst. for Plant Res., Inc., Yonkers, N. Y., and W. M. Lanham, Union Carbide Chem. Co., South Charleston, W. Va.

The synthesis, insecticidal performance, chemical structure-activity relationships and mammalian toxicity of a novel class of cyclic phosphate insecticides are presented.

Symposia No.

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C-d. Ecology & Bionomics
Chairman: G. T. York
Reception Room

11:24 151. Effects of Forest Tent Caterpillar, *Malacosoma disstria* Hbn., Outbreaks on Stands of Trembling Aspen in Manitoba and Saskatchewan. V. Hildahl and W. A. Reeks, Forest Biol. Lab., Winnipeg 1, Manitoba.

Infestations of *M. disstria* over a 30-year period are reviewed from the standpoint of outbreak patterns. Two recent outbreaks did not cause important mortality of aspen, but increment loss is estimated at 8.4% of the basal area in stands covering about 1,500,000 acres.

E-b. Plant Pest Control & Quar.
Chairmen: K. Dorward & N. P. Beaudoin
Parlor H

11:36

FINAL BUSINESS MEETING, ESA SECTIONS

Section A. General Entomology
Michigan Room — J. A. Slater, *Chairman*

Section B. Physiology and Toxicology
Grand Ballroom — J. McD. Grayson, *Chairman*

Section C. Insect Biology
English Room — L. S. Jones, *Chairman*

Section D. Medical and Veterinary Entomology
Normandie Room — Herbert Knutson, *Chairman*

Section E. Control, Extension and Regulatory Entomology
Parlor H — R. L. Janes, *Chairman*

Section F. Chemical Control Investigations
Crystal Ballroom — J. B. Moore, *Chairman*

FINAL BUSINESS MEETING, ENTOMOLOGICAL SOCIETY OF ONTARIO
Reception Room — President A. G. McNally, *Presiding*

NOON RECESS

A. General Entomology Chairman: G. P. Holland Michigan Room	B. Physiol. & Toxicol. Chairman: R. D. O'Brien Grand Ballroom	Symposia No.	C-d. Ecology & Bionomics Chairman: R. F. Morris English Room	D. Medical and Vet. Chairman: H. Knutson Reception Room
1:30 152. Hermaphroditic Rudiments in Males of *Blattella germanica* (L.). M. A. Brooks, Dept. of Ent. & Econ. Zool., Univ. of Minn., St. Paul 1. Histological preparations of embryos and nymphs trace the development of rudimentary ovaries in males. While they are constant, persisting to the adult stage, there are no rudimentary testes in females. This finding substantiates the original report of Heymons (1890) which was discredited by his contemporaries.	**1:30 153. The Effect of Dietary Cholesterol on House Fly Reproduction. R. E. Monroe, Ent. Res. Div., ARS, USDA, Beltsville, Md.** The role of dietary cholesterol in house fly reproduction has been studied employing a synthetic diet. The effect of a sterol deficiency on total egg production, egg hatch, and larval development was determined. Various concentrations of cholesterol were tested to determine the minimal concentration required to support reproduction.	11 12	**1:30 154. Fecundity of the Forest Tent Caterpillar During the Course of an Outbreak in Minnesota. A. C. Hodson, Dept. of Ent. and Econ. Zool., Univ. of Minn., St. Paul 1.** Egg band survey collections made each fall, 1948–59, provided data on egg band abundance, number of eggs per band and egg mortality. Excessive crowding, accompanied by various degrees of starvation, caused marked decreases in egg band size, but had little effect on mortality.	**1:30 155. Summer Activity and Host Preference of *Culex salinarius* Coq. Females in Delaware. F. J. Murphey and R. F. Darsie, Jr., Univ. of Delaware, Newark.** A series of experiments were conducted at the Bombay Hook National Wildlife Refuge during the summers of 1958 and 1959. Landing, light-trap and biting counts were correlated with various environmental factors. Likewise host preference feeding research extended over this period. Birds, mammals and reptiles were studied.
1:42 156. Balloon Wing, A New Mutation in *Blattella germanica* (L.). D. G. Cochran and Mary H. Ross, Dept. of Ent., V.P.I., Blacksburg. On the forewings a large, oval or pear-shaped bubble, usually occurs in the central portion of the wing. On the hindwings the bubble is oblong, occurring in the distal half. The bubbles are filled with hemolymph, and surrounding areas of the wing are frequently swollen.	**1:42 157. The Influence of Diet on Egg Production in the House Fly. P. E. Morrison and D. M. Davies, McMaster Univ., Hamilton, Ont.** An investigation of chemically defined diets substituted for the protein meal necessary to induce egg development in *M. domestica* is reported. Experiments with mated females fed *ad libidum* indicated the requirements of certain amino acids for egg development and oviposition.	11 12	**1:42 158. The Relative Effects of Cocoon Submergence on the Mortality of the Larch Sawfly, *Pristiphora erichsonii* (Htg.), and Its Tachinid Parasite *Bessa harveyi* (Tnsd.). R. J. Heron, Forest Biol. Lab., Winnipeg 1, Manitoba.** Larch sawfly cocoons removed from cold storage in May were subjected to submergence treatments at 10°C. and 15°C. Contrasting to the known tolerance of the host, the parasite was very susceptible. Susceptibility of the parasite was related to its early inceptions of development and its active growth and metabolism.	**1:42 159. Some New and Little Known Nasal Mites of Birds and Mammals. K. E. Hyland, Dept. of Zool., Univ. of Rhode Island, Kingston, D. T. Clark and H. G. Ford, Michigan State Univ., East Lansing.** Nasal mites representing the families Rhinonyssidae, Speleognathidae, and Epidermoptidae have been recovered from a variety of birds and mammals collected in Kalamazoo County, Michigan, and from other areas in Northeastern United States. Recent collecting indicated a new fauna associated with small mammals, especially rodents and bats.
1:54 160. The Abdominal Musculature of Weevil Larvae. W. H. Anderson, Insect Identification, USDA, U. S. National Museum, Washington 25, D. C. Larvae of various systematic groups of weevils appear to be very similar. There are, however, differences in the number of body areas or "folds" on typical abdominal segments. Study of musculature makes possible a wholly satisfactory interpretation of the homologies of these areas.	**1:54 161. The Humoral Control of Egg Maturation in the Mosquito. J. R. Larsen, Jr., Univ. of Pa., Phila., and Dietrich Bodenstein, U. S. Public Health Gerontology Branch, Baltimore City Hosp., Md.** By a series of corpra allata and ovary transplantations, specially designed ligation experiments, and experimentally induced gut distention, the humoral factors governing the process of egg maturation was elucidated. The relationship of humoral factors to blood meal and gut distention became evident in *Culex pipiens, C. molestus* and *Aedes aegypti.*	11 12	**1:54 162. Results with Different Diets for Laboratory Rearing of the Sugarcane Borer, *Diatraea saccharalis* (F.). Y. S. Pan and W. H. Long, L. S. U., Baton Rouge.** Larvae were successfully reared under aseptic conditions through several generations on sterilized portions of sugarcane stalks. Several artificial diets were tried; the best of these is compared with the sterilized cane stalks. Moths, maintained without food, lived as long and laid as many eggs as moths provided with honey solution.	**1:54 163. Studies on Bionomics and Longevity of *Haemagogus equinus* Theobald Adults in the Laboratory. P. A. Woke, Lab. Trop. Virology, Natl. Inst. Health, Bethesda, Md.** Using improved methods, longevity in the laboratory of adults has been increased over previous records for females by ⅓ to present maximum of 94 days and for males by ⅔ to present maximum of 107 days. Mortality rate of males was similar to that of females.

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2:06 164. Field Infestations of *Sitophilus oryza* (L.) in Native and Hybrid Corns in the Mexican Tropics. D. Candia Z. and Douglas Barnes, Agr. Program of the Rockefeller Foundation, Mexico 6, D. F. Field infestations of *S. oryza* were compared in ears of native and hybrid corn which exhibited differences in their respective husk lengths and thicknesses. The native corns, characterized by longer and thicker husks, sustained less infestation than did the hybrids.	**2:06 165. The Effects and Importance of the Male in the Longevity and Productivity of *Aedes aegypti* (L.) Adults. J. N. Liles and D. M. DeLong, Ohio State Univ., Columbus 10.** Data are presented indicating the importance of the male to the present and succeeding generations. Data are also given concerning male and female longevities when the sexes are feared separately and together.	11 12	**2:06 166. Comparisons of Several Diets for Producing Pink Bollworms in the Laboratory. P. L. Adkisson and D. L. Bull, Texas Agr. Expt. Sta., College Station.** The developmental period of the pink bollworm when produced on synthetic diets was studied. The shortest developmental period occurred on a raw cottonseed meal media and the longest on a purified casein media. A media based on wheat germ meal appeared to be the most satisfactory for general laboratory rearing.	**2:06 167. Induction of Flea Bite Sensitivity in Guinea Pigs by Flea Antigens. E. Benjamini, B. F. Feingold, Kaiser Foundation Res. Inst., and Leo Kartman, DHEW, PHS, CDCA, Field Sta., San Francisco, Cal.** Guinea pigs were sensitized to flea bites by intradermal injections of whole flea antigens. Hypersensitivity was preceded by a latent period and appeared to be independent of dosage. Hypersensitivity was first manifested by a delayed type which later was transformed into an immediate type of reactivity.
2:18 168. Effects of Temperature on Stridulation of the Meadow Grasshopper, *Orchelimum vulgare*. Hubert Frings and Mable Frings, Pa. State Univ., University Park. The ordinary songs of 14 males at a series of controlled temperatures from 13° to 36°C. were tape recorded and analyzed oscillographically. The rates were greater at higher temperatures, but with striking variations from individual to individual and from time to time in the same individual.	**2:18 169. The Importance of Parental Age in the Longevity and Productivity of Several Physiological Strains of *Aedes aegypti* (L.). J. N. Liles and D. M. DeLong, Ohio State Univ., Columbus 10.** The method involved evaluation of adults which resulted from eggs laid on selected days of the egg laying period of the previous generation. The age of the parents proved important to both longevity and productivity of the offspring. Comparisons were made between several different strains.	11 12	**2:18 170. Granary Mites Cultured on Fungi. M. W. Rumsey and David Pimentel, Dept. of Ent., N. Y. S. Coll. of Agr., Cornell Univ., Ithaca.** Several species of granary mites have been cultured exclusively on a fungus.	**2:18 171. Influence of Aeration on Radiation Dose Required to Sterilize Screwworm Pupae. A. H. Baumhover, ARS, USDA, Sebring, Fla.** Previous work showed need for increasing dose level as pupae develop. Tests reported here show that dose level (Cobalt-60), as it affects degree of sterilization, is independent of pupal age when aeration is provided. Increase in dose level required without aeration closely parallels increase in respiration rate.
2:30 172. The Acoustical Behavior of Naturally Hybridizing Katydid Populations. K. C. Shaw and R. D. Alexander, Univ. of Mich., Museum of Zool., Ann Arbor. Northern and southern populations of *Pterophylla camellifolia* (Fabricius) differ in song pattern and morphological characters. The intergradation zone in the Appalachian Mountains has been mapped in detail, and the change in song pattern analyzed along continuous transects. Discordances in male chorusing behavior resulting from song differences have been studied.	**2:30 173. Further Studies on the Effects of Parental Age on the Mealworm, *Tenebrio molitor* L. Daniel Ludwig, Fordham Univ., New York City.** Eggs were collected 2 weeks from emergence until death. At 30°C. larvae from old grew at a more rapid rate than those from young parents. At 25° and 20° those from old had a shorter larval life and fewer molts. These effects were not noted until one month following emergence.	11 12	**2:30 174. Biological Investigations of the Tobacco Wireworm, *Conoderus vespertinus* (F.). R. L. Rabb, Ent. Dept., N. C. State Coll., Raleigh.** Insects reared under field and insectary conditions, and field populations of adults, larvae and pupae were sampled seasonally. Data on oviposition and longevity of adults and on the duration and seasonal occurrence of the life stages are presented.	**2:30 175. Efficacy of Diethyltoluamide as a Repellent Against Mosquitoes in the Nipah Palm-Mangrove Swamps in Malaya. Robert Traub and B. L. Elisberg, U. S. Army Med. Res. Unit (Malaya), c/o Inst. for Med. Res., Kuala Lumpur, Malaya.** In the Malayan mangrove swamps, where unprotected individuals were attacked by 25 species of mosquitoes at the rate of 274 mosquitoes per man per hour, volunteers utilizing diethyltoluamide obtained almost solid protection for a period of six hours. Diethyltoluamide proved to be far superior to M-2020 repellent.

A. General Entomology Chairman: G. P. Holland Michigan Room	B. Physiol. & Toxicol. Chairman: R. D. O'Brien Grand Ballroom	Symposia No.	C-d. Ecology & Bionomics Chairman: R. F. Morris English Room	D. Medical and Vet. Chairman: H. Knutson Reception Room
2:42 176. Chemoreceptors on the Antennal Flagellum of the Grasshopper (Orthoptera, Acrididae). Eleanor H. Slifer, State Univ. of Iowa, Iowa City. Conclusions concerning the fine structure of the principal chemoreceptors as determined by light and electron microscopy are presented.	**2:42 177. Factors in the Aging of Insects. Morris Rockstein, N. Y. U. Coll. of Med., New York 16.** The male house fly showed a mean longevity of 17.4 days, the female 29.4 days. Limitation of the adult diet to sucrose and water markedly reduced female longevity but did not alter male longevity appreciably. The male fly, however, eventually showed loss in flight ability and abraded to missing wings.		**2:42 178. The Distribution and Abundance of Wireworms in the Annapolis Valley of Nova Scotia. C. J. S. Fox, CDA, Res. Branch, Res. Sta., Kentville, Nova Scotia.** 11 Results of a survey of the wireworms of the Annapolis Valley of Nova Scotia are given. The numbers of wireworms were greater as the fineness of soil and the age of grassland increased. Populations declined under cultivation but apparently were not influenced by soil pH. Eleven species were collected.	**2:42 179. Use of an Animal Membrane in the Evaluation of Chemical Repellents Against Stable Flies, *Stomoxys calcitrans* (L.). Philip Granett, Dept. of Ent., Rutgers Univ., New Brunswick, N. J.** Fly repellents can be applied to an ox caecum membrane called "Silverlight." Effectiveness is determined by the number of flies prevented from feeding when the untreated side of a membrane is in contact with warmed beef blood. A fluorescent dye in the blood facilitates the counting of unrepelled flies.
2:54 180. Case-Building Behavior of Caddisfly Larvae. K. W. Cummins, Dept. of Zool., Univ. of Mich., Ann Arbor. The case-building habits of 4 species of caddisflies were observed and their ability to utilize other than their normal substrates investigated. These findings are discussed in relation to the micro-distribution of the various species.	**2:54 181. Interrelationships Between Non-Diapause, Sex and Pupal Color in Spruce Budworm. G. T. Harvey and G. Stehr, Forest Insect Lab., Sault Ste. Marie, Ont.** After three generations of selection for non-diapause, stocks no longer contained pupae with green hemolymph, but were all yellow. Also, males were in excess in many families. Analysis reveals significant relationships between diapause behavior and sex, and between diapause behavior and pupal color, a sex-controlled polymorphic character.		**2:54 182. Toxicity of Decaying Food To Wireworms and Mealworms. J. B. Kring, Conn. Agr. Expt. Sta., New Haven.** 11 Mortality among wireworms was observed in the presence of decaying food. Death occurred only with bacterial decomposition and resulted from contact of the larvae with the products of bacterial growth and not from infection. Similar results were obtained with mealworms.	**2:54 183. Natural Attractiveness of Five Subjects to *Aedes aegypti* (L.) and Protection Times Obtained with Repellents. H. K. Gouck and I. H. Gilbert, Ent. Res. Div., ARS, USDA, Orlando, Fla.** Natural attractiveness to mosquitoes (biting rate), protection times with 3 repellents, and rate of repellent loss were determined for two women and three men. The least attractive subject, a man, received the least protection. Shaving the arms of the men reduced differences in their natural attractiveness.

3:06 **RECESS**

3:18 Plenary Session: Guest Speaker

Insect Pathology and Biological Control in Czechoslovakia and Socialist Countries.
JAROSLAV J. WEISER, Laboratory of Insect Pathology, Institute of Biology, Academy of Sciences, Prague, Czechoslovakia.

4:06 **FINAL BUSINESS MEETINGS**

Entomological Society of America
Grand Ballroom

Entomological Society of Canada
Crystal Ballroom

WEDNESDAY P.M., DEC. 2

5:30 **DINNER RECESS**

8:00 Youth in Entomology: 4-H Club Demonstration, Crystal Ballroom.

8:15 Entomology in the U. S. S. R.

Crystal Ballroom

An illustrated report by the members of the U. S. delegation of entomologists to the U. S. S. R. this summer.

P. W. Oman, ARS, USDA, Leader
L. F. Curl, ARS, USDA
T. B. Davich, ARS, USDA
H. L. Haller, ARS, USDA
H. M. Harris, Iowa State Univ.
C. B. Huffaker, Univ. of Calif.
J. V. Osmun, Purdue Univ.

Roundtable: Systematics, Biology and Economic Importance of Ceratopogonidae (Part 2).

Normandie Room

Moderator: W. W. Wirth, ARS, USDA, Washington, D. C.

A Roundtable discussion following the formal presentation of this subject in Symposium 9, Wednesday a.m.

THURSDAY A.M., DEC. 3

C-c. Insects & Plant Diseases
Chairman: R. H. Bradley
Michigan Room

9:00 184. *Phenacoccus solani* Ferris, a toxicogenic insect. Walter Carter, Pineapple Res. Inst. of Hawaii, Honolulu 2.

The insect is not known to occur on pineapple plants but when transferred is violently toxic. Translocation of the toxin causes white chlorotic streaks devoid of chloroplasts to the heart of the plant. Toxicogenicity is inherent in the insect. Affected plants recover when the insects are removed.

C-d. Ecology & Bionomics
Chairman: G. T. York
English Room

9:00 185. Influence of Nematodes and a Tagging Solution on the Flight Performance of the Engelmann Spruce Beetle. R. H. Nagel, Rocky Mt. Forest & Range Expt. Sta., USDA, Ft. Collins, Colo., and J. F. Chansler, School of Natural Resources, Univ. of Mich., Ann Arbor.

By means of flight mills, flight performances with captive beetles were recorded and compared for (1) possible adverse effects of tagging solutions used earlier in dispersal studies; and (2) the influence of nematodes on flight in the case of infested specimens.

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D. Medical and Vet.
Chairman: H. Knutson
Reception Room

9:00 186. Invited Speaker: H. C. Barnett, Walter Reed Medical Center, Washington, D. C. Relationships of Arthropods to Human and Veterinary Diseases.

F. Chemical Control
Chairman: J. B. Moore
Crystal Ballroom

9:00 187. Investigations with Systemic Insecticides on Introduced Pine Sawfly Control and Parasite Survival. H. C. Coppel and D. M. Norris, Jr., Dept. of Ent., Univ. of Wis., Madison 6.

Basal injection of white pines 4 to 6 inches in diameter with phorate, demeton, Tetram, or Shell 3562 killed feeding larvae. Tetram applied in 1958 remained toxic in 1959. No phytotoxicity was observed. Hymenopterous and dipterous parasites caged with foliage from injected trees were not affected.

C-c. Insects & Plant Diseases
Chairman: R. H. Bradley
Michigan Room

9:12 188. A Study of Mealybug, *Dysmicoccus brevipes* (Ckl.), Populations in an Ant-Free Field. Walter Carter, Pineapple Res. Inst. of Hawaii, Honolulu 2.

Mealybug populations were measured with and without spray in the absence of ants. Leaf colonies were very small but no differences developed between sprayed and unsprayed plots. Subterranean colonies were roughly correlated with the occurrence of incidental wilting of pineapple plants.

9:24 191. Further Studies in the Prevention of Bark Beetle Transmission of *Ceratocystis ulmi* (Buis.) Moreau with the Systemic, Chipman R-6199. Abdullah Al-Azawi and D. M. Norris, Jr., Univ. of Wis., Madison 6.

Forest-inhabiting American elms were treated with Chipman R-6199 by trunk implantation on May 8, 1959. No infections occurred in treated trees exposed to fungus-bearing bark beetles during the last two weeks of May. In untreated trees, 33.3 and 14.3% infection occurred, respectively, during the third and fourth weeks.

9:36 194. Reduction of Twig Feeding of *Scolytus multistriatus* (Marsh.) in Elm by Trunk Implantation of Shell 3562. D. M. Norris, Jr., Univ. of Wis., Madison 6.

Dosages, ranging from 6 to 24 grams actual per 3" d.b.h. tree, reduced the length of feeding niches so that beetle transmission of the Dutch elm disease fungus would not occur. Residual effectiveness varied with dosage.

C-d. Ecology & Bionomics
Chairman: G. T. York
English Room

9:12 189. Nematode Parasites and Associates of *Ips confusus* in Pinyon Pine. C. L. Massey, Rocky Mt. Forest & Range Expt. Sta., Forest Insect Lab., Albuquerque, N. M.

Research was conducted on the nematode parasites of *I. confusus*, the California five-spined engraver, to determine its nematode parasites and associates. One new species, *Aphelenchulus elongatus*, was recovered from a large percentage of the insects. This species seriously affects the egg-producing capacity of infected female beetles.

9:24 192. Some Interactions Between European Pine Shoot Moth, *Rhyacionia buoliana* (Schiff.), and Host Species. D. L. Haynes and J. W. Butcher, Dept. of Ent., Mich. State Univ., East Lansing.

During 1958 and 1959, reactions of European pine shoot moth population to its important Michigan hosts were studied. Efforts were made to correlate insect development with host phenology. Data are presented which purport to emphasize the importance of oviposition preference to subsequent infestation levels on red and Scotch pine.

9:36 195. Foodplant Selection and Voltinism in the Genus *Erynnis* (Lepidoptera: Hesperiidae). J. M. Burns, Dept. of Zool., Univ. of Cal., Berkeley.

Field observations and rearing, examination of several thousand museum specimens, and a review of the literature have led to a critical reappraisal of the bionomics of the dusky-wing skipper butterflies. Voltinism and contrasting patterns of foodplant selection in two species groups are emphasized.

Symposia

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D. Medical and Vet.
Chairman: H. Knutson
Reception Room

9:12 186. H. C. Barnett, continued.

9:24 186. H. C. Barnett, continued.

9:36 196. Invited Speaker: A. S. West, Queen's Univ., Kingston, Ont. Relationships of Arthropods to Human and Veterinary Diseases.

F. Chemical Control
Chairman: J. B. Moore
Crystal Ballroom

9:12 190. Cabbage Aphid Contro. with Systemic Insecticides. A. C. Davis, G. E. R. Hervey, and F. L. McEwen, N. Y. S. Agr. Expt. Sta., Cornell Univ., Geneva.

Granular formulations of phorate, DiSyston and dimethoate were applied in the furrows to broccoli plants after transplanting. DiSyston gave control until harvest time but dimethoate was only effective for 6 weeks or so. Phorate was not effective when used in this manner.

9:24 193. The Use of Surfactants with Delnav (Technical 2,3-p-Dioxanedithiol S,S-bis O,O-diethyl phosphorodithioate) to Increase Leaf Penetration. K. D. Ihde, E. N. Woodbury, and M. H. Frost, Jr., Agr. Chem. Lab., Hercules Powder Co., Wilmington, Del.

Laboratory tests have shown that certain surfactants, when added to Delnav sprays, increase the penetration of leaf tissue by this pesticide. Field tests, on crops on which good spray coverage of the underside of leaves is difficult, have shown that the increased penetration results in increased mite control.

9:36 197. Aircraft Deposits of Insecticide Dusts and Sprays on Flue-Cured Tobacco Plants. G. F. Manson, J. R. W. Miles, and W. W. Sans, Ent. Lab., Chatham, Ont.

Insecticide deposits applied by commercial aircraft to tobacco fields were measured chemically. Masking techniques permitted separation of deposits on upper and lower leaf surfaces. Underleaf coverage was extremely light at all normal application rates.

C-c. Insects & Plant Diseases
Chairman: R. H. Bradley
Michigan Room

9:48 198. Resistance to the Potato Leafhopper, *Empoasca fabae* (Harris), Among Certain Tuber-Bearing Solanums. O. V. Carlson, E. T. Hibbs, and W. H. Orgell, Dept. of Zool. and Ent., Iowa State Univ., Ames.

Potato leafhopper oviposition, nymphal infestations, and damage (hopperburn) of potato plants were observed in the field and greenhouse. Marked oviposition preferences were reflected in nymphal populations. Nymphal survival and development rate were nearly uniform among strains of potato. Potato selections exhibited large differences in the extent of hopperburn.

C-d. Ecology & Bionomics
Chairman: G. T. York
English Room

9:48 199. Predicting Pale Western Cutworm, *Agrotis orthogonia* Morr., Infestations in Nebraska. K. P. Pruess, Dept. of Ent., Univ. of Neb., Lincoln.

A method for predicting infestations of this cutworm, based on rainfall, has been modified from earlier methods for use in Nebraska. Ecological relationships between weather, parasites, and diseases of this cutworm are discussed.

10:00 201. Environmental Factors Influencing the Rate of Hatch of Eggs of the Pale Western Cutworm, *Agrotis orthogonia* Morr. L. A. Jacobson, CDA, Res. Sta., Lethbridge, Alta.

Eggs of the cutworm were held at various constant temperatures and then at temperatures below the incubating temperature for various periods. The rate of hatch was influenced by temperature during and after incubation, and by the age and vigor of the females.

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D. Medical and Vet.
Chairman: H. Knutson
Reception Room

9:48 196. A. S. West, continued.

10:00 196. A. S. West, continued.

F. Chemical Control
Chairman: J. B. Moore
Crystal Ballroom

9:48 200. Designing Orchard Experiments for European Red Mite Control. R. J. Daum and J. E. Dewey, Dept. of Ent., N. Y. S. Coll. of Agr., Cornell Univ., Ithaca.

Experimental designs to properly evaluate acaricides under orchard conditions are discussed. Glyodin suppressed early season European red mite buildup and ovex was effective in preventing red mite populations from building up during the summer.

10:00 202. Control of Orchard Mites Infesting Peach Foliage. R. W. Rings, Ohio Agr. Expt. Sta., Wooster.

Twenty acaricides were evaluated over a three-year period for the control of the European red mite and the two-spotted spider mite. Tedion and Kelthane gave outstanding control of both mite species in mid-season sprays and excellent control of red mite in early season sprays.

10:12 **RECESS**

C-c. Insects & Plant Diseases Chairman: R. H. Bradley Michigan Room	C-d. Ecology & Bionomics Chairman: G. T. York English Room	Symposia No.	D. Medical and Vet. Chairman: H. Knutson Reception Room	F. Chemical Control Chairman: J. B. Moore Crystal Ballroom
	10:24 203. Effects of Centrifugation and Similar Stress on Size and Developmental Period of Insects. Nancy J. Parker and David Pimentel, Dept. of Ent., N. Y. S. Coll. of Agr., Cornell Univ., Ithaca. A slowly rotating vertical wheel where there was no gravitational field to which larvae could orient themselves had greater effect than a rapidly rotating wheel which produced a gravitational force several times greater than normal.	14 15	**10:24 204. Invited Speaker: H. D. Pratt, U. S. Public Health Service, Atlanta, Ga. Present Status of Some Important Arthropod-Borne Diseases.**	**10:24 205. Control of European Red Mite in Apples, Plums, Pears, and Peaches. Wally Versaw and R. G. Haines, Mich. State Univ., East Lansing.** Studies were conducted over a three-year period on plot size and layout, sampling and counting techniques, and methods of interpretation of data.
	10:36 206. Diurnal Behavior of the Alfalfa Weevil, *Hypera postica* (Gyll.), as Related to Light, Temperature, and Humidity. G. O. Poinar, Jr., and G. G. Gyrisco, Dept. of Ent., N. Y. S. Coll. of Agr., Cornell Univ., Ithaca. In randomized block experiments, sweeps were taken at regular intervals over 24-hour periods to study the effect of light, temperature, and humidity on the diurnal behavior of the alfalfa weevil. Increased activity of the adult weevils in the evening was most closely correlated with light intensity.	14 15	**10:36 204. H. D. Pratt, continued.**	**10:36 207. Laboratory Studies with Tedion Formulations Against the Two-Spotted Mite. P. C. Lippold, Niagara Chem. Div., Middleport, N. Y.** Wettable powder and emulsifiable liquid formulations of Tedion were evaluated against the two-spotted mite, *Tetranychus telarius* L. Materials were applied by dip application. The emulsifiable liquid formulation was more effective in ovicidal activity, systemic properties, ovarian sterilant action, control of adult mites, and control of tolerant strains.
	10:48 208. The Influence of Temperature on Diapause in Laboratory Reared Pink Bollworms, *Pectinophora gossypiella* (Saund.). D. L. Bull and P. L. Adkisson, Texas Agr. Expt. Sta., College Station. Investigations emphasize the importance of temperature as a factor influencing the incidence of diapause in pink bollworm larvae. At temperatures of 80°–85° F., diapause rarely occurs in the laboratory but increases markedly as temperature decreases from 80° F. Diapause appears to be initiated prior to the final larval instar.	14 15	**10:48 209. Invited Speaker: W. C. McDuffie, ARS, USDA, Beltsville, Md. Highlights in Medical and Veterinary Entomology During the Past Year.**	**10:48 210. Ovicidal Efficiency of Paraffinic Petroleum Fractions Against Winter Eggs of the European Red Mite. P. J. Chapman, A. W. Avens, and S. E. Lienk, N. Y. S. Agr. Expt. Sta., Cornell Univ., Geneva.** In laboratory evaluations of paraffinic petroleum fractions, products ranging in viscosity from 150 seconds (SUS at 100° F.) down to approximately 50 seconds proved equally effective. Naturally occurring winter eggs of the European red mite, *Panonychus ulmi* (Koch), were utilized as the test species.

THURSDAY A.M., DEC. 3

B. Physiol. & Toxicol. Chairman: J. McD. Grayson Grand Ballroom	C-d. Ecology & Bionomics Chairman: G. T. York English Room	Symposia No.	D. Medical and Vet. Chairman: H. Knutson Reception Room	F. Chemical Control Chairman: J. B. Moore Crystal Ballroom
	11:00 211. Effect of Grain Moisture Content on the Movement of Insects in Wheat. F. L. Watters, CDA, Res. Sta., Univ. of Manitoba, Winnipeg. Laboratory studies show that emigration of adults of *Cryptolestes ferrugineus* (Steph.) was greater from dry than from damp wheat provided no molds developed. There were no differences between emigration rates at population densities of 5, 10, 25, and 50 adults per 100 gm. of wheat.	14 15	**11:00 209. W. C. McDuffie, continued.**	**11:00 212. Field Evaluation of Paraffinic Type Petroleum Oils of Varying Viscosities. S. E. Lienk, E. H. Smith, P. J. Chapman, A. W. Avens, and B. Fiori, N. Y. S. Agr. Expt. Sta., Cornell Univ., Geneva.** Paraffinic petroleum oils ranging in viscosity from 30 to 150 seconds (SUS at 100° F.) were evaluated in orchard tests against the European red mite, European fruit lecanium, cottony peach scale, and pear psylla as dormant or semi-dormant sprays. Products ranging from 70 to 150 seconds viscosity were equally effective.
11:12 213. Responses of the European Corn Borer to Chemical Extracts of Corn. B. W. George and L. E. O'Keeffe, Dept. of Zool. & Ent., Iowa State Univ., Ames. Plant parts from four lines of corn were extracted with solvents. Fractions were fed to corn borers to determine attractiveness to first-instar larvae. Growth was inhibited by many fractions; some were also attractive to the larvae. Coixol was found in some of the inhibitory fractions.	**11:12 214. Behavior and Fecundity of the Green Peach Aphid, *Myzus persicae* (Sulz.), on Plants Grown in Compost-Treated, Fertilizer-Treated, and Infertile Soils. W. L. Freeman, Dept. of Ent., N. Y. S. Coll. of Agr., Cornell Univ., Ithaca.** When radishes were grown on compost-treated, fertilizer-treated, and infertile soils, the green peach aphid preferred to feed and produced the most offspring on plants grown on the fertilizer-treated soil. The infertile soil proved to be the least suitable.	15	**11:12 215. Evaluation of Compounds as Residual Agents for the Control of Adult Mosquitoes. Willis Mathis and H. F. Schoof, Communicable Disease Center, Public Health Service, Savannah, Ga.** Ten compounds were evaluated at three dosages alone and one dosage in combination with DDT on plywood panels in laboratory tests. Guthion, Bayer 29493, Bayer 34098, and malathion gave the more promising results. All formulations were made from wettable powders.	**11:12 216. Aldrin Soil Treatment for Plum Curculio Control in Peach Orchards. C. I. Snapp, Ent. Res. Div., ARS, USDA, Fort Valley, Ga.** Following application of 2.3 pounds aldrin per acre to the soil of a 441-tree peach orchard in March, 1957, plum curculio infestation in fruit at harvest was 1.6, 2.9, and 0.7 per cent in 1957, 1958, and 1959, respectively. No insecticides were applied to the trees in those years.
11:24 217. The Relation Between Temperature and Flashing Intervals in Adult Male Fireflies, *Photinus pyralis* (L.). L. N. Edmunds, Jr., Ent. Res. Div., ARS, USDA, Beltsville, Md. The length of the flashing intervals in male fireflies varies inversely with the temperature. This relationship, however, is not a simple linear one.	**11:24 218. Eggs of Insects with Emphasis on Research Techniques. Alvah Peterson, Fla. State Plant Board, Gainesville.** Eggs of many insects were found to be highly specific in color, detailed structure, position and mass relationship. Striking similarities were found in some cases between species and family. Methods were developed for obtaining and preserving eggs.	15	**11:24 219. Differential Resistance to DDT in Larvae and Adults of *Aedes sollicitans* (Wlk.) in Delaware. R. F. Darsie, Jr., Univ. of Del., Newark.** Some populations were found to be resistant to DDT in 1956 and to gamma BHC in 1958. Although adults were tolerant of DDT in 1956, tests in 1958–1959 indicated loss of tolerance. Larvae continued to exhibit resistance in 1958–1959 when compared to previous laboratory and field tests.	**11:24 220. Biology and Control of Apple Aphids. J. B. Tatter and R. G. Haines, Mich. State Univ., East Lansing.** Three species of aphids were studied: apple grain aphid, rosy aphid, green apple aphid. Initial occurrence, timing, and control measures are discussed for each.

THURSDAY A.M., DEC. 3

B. Physiol. & Toxicol. Chairman: J. McD. Grayson Grand Ballroom	C-d. Ecology & Bionomics Chairman: G. T. York English Room	Symposia No.	D. Medical and Vet. Chairman: H. Knutson Reception Room	F. Chemical Control Chairman: J. B. Moore Crystal Ballroom
11:36 221. Properties of the Firefly Neuro-Photocyte Linkage. James Case, Dept. of Zool., Univ. of Iowa, Iowa City, and John Buck, Nat. Inst. of Health, Bethesda, Md. By means of standard neurophysiological techniques, the regulation of light emission in two genera of fireflies, *Photuris* and *Photinus*, has been investigated. While the neuroeffector linkage is reminiscent of neuromuscular junctions, it has many unusual properties, some of which are discussed.	**11:36 222. The Gross Structure of the Nest of *Atta texana*. J. C. Moser, USDA, Southern Forest Expt. Sta., Alexandria, La.** A 4-year old nest was excavated with a bulldozer. All fungus gardens, detritus cavities, hibernation cavities, and many of the galleries and tunnels were mapped in detail with a plane table. The gross morphology of the nest and its possible significance to control are discussed.		**11:36 223. Comparison of Several Insecticides and Application Methods for Control of Resistant House Flies in Dairy Barns. V. P. Castellano, J. G. Matthysse, R. Axtell, and L. Kraus, N. Y. S. Coll. of Agr., Cornell Univ., Ithaca.** Diazinon, ronnel, dimethoate, Bayer 29493, lindane, Dibrom deposits; Diazinon-parathion cords; "Fliegenbander" ribbons; Diazinon-manure treatment plus cords, or plus spraying, were compared. Dimethoate spraying gave the best control. Phosphate resistance reduced efficiency of Diazinon and ronnel. Baited ribbons were fairly effective. The level of resistance is discussed.	**11:36 224. Biology and Control of Grape Berry Moth. Thomas Hood and R. G. Haines, Mich. State Univ., East Lansing.** Studies were conducted on survey techniques, occurrence of broods, relative abundance, and control.
11:48 225. Comparative Studies on the Venoms of Two Species of Fire ants (*Solenopsis* spp.). M. S. Blum, A. F. Novak, and H. C. Austin, L. S. U., Baton Rouge. The venoms of the indigenous southern fire ant and the imported fire ant have very similar chemical and physiological properties. Spectral data indicate that the key demonstrable functional groups are common to both venoms. Both venoms are highly active against bacteria, fungi, and insects.	**11:48 226. Inquilines Found Within the Nest of *Atta texana*. J. C. Moser, USDA, Southern Forest Expt. Sta., Alexandria, La.** About 44 species of arthropods have been reported in nests of *Atta texana*, many of which have been found in recent excavations. These arthropods play various roles and occupy definite special positions in the nest. Their significance to the ant and taxonomic difficulties are discussed and illustrated.		**11:48 227. Fly Control in Dairy Barns Sprayed with Dimethoate. Tien-Hsi Cheng and D. E. H. Frear, Depts. of Zool. and Ent. and Agr. Biol. Chem., Pa. State Univ., Univ. Park.** Dimethoate at 0.5 and 1% gave excellent control of horn fly, house fly, and muscid fly. Residual effects lasted from 5 to 9 weeks. Stable flies appeared in the barns for brief periods but were effectively controlled.	**11:48 228. Fruit Insect Control by Aerial Applications of Dusts and Sprays. R. G. Haines, Mich. State Univ., East Lansing.** Studies were conducted on: (1) control by aerial dust or spray programs; (2) ground sprays as supplement to aerial applications; (3) aerial applications as supplement to ground sprays; (4) evaluation of dust carriers. Results indicated aerial dusts and sprays can be used commercially with success.

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NOON RECESS

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1:30 229. Metabolism of C^{14}-Cholesterol by Nymphal German Cockroaches. W. E. Robbins, J. N. Kaplanis, R. E. Monroe and L. A. Tabor, Ent. Res. Div., ARS, USDA, Beltsville, Md. Nymphal German cockroaches were held on a diet containing C^{14}-cholesterol. After two weeks the roaches and their excreta were extracted and analyzed. The C^{14} compounds were fractionated and analyzed by several column and paper chromatographic systems. The isolation and identification of some of the C^{14} compounds are discussed.	**1:30 230. The Biology of *Melissodes bimaculata* (Lep.) in Indiana (Hymenoptera, Anthophoridae). Leland Chandler, Dept. of Ent., Purdue Univ., Lafayette, Ind.** Nests of this species have been found throughout a wide range of habitats. The species is solitary but may nest gregariously over large areas. An unusual feature of cell provisioning is the nectar thickening process carried out by the female. Details of nest structure, development and enemies are given.		**1:30 231. Relative Toxicity, Knockdown Effectiveness, and Intensity of Synergism of Mixtures of Piperonyl Butoxide with Barthrin and Some of Its Isomers. W. A. Gersdorff and P. G. Piquett, USDA, ARS, Ent. Res. Div., Beltsville, Md.** When applied to house flies in 10:1 proportion, mixtures of piperonyl butoxide with the 6-chloropiperonyl esters of *d-trans-*, *dl-trans-*, *dl-cis-*, and *dl-cis-trans-*(barthrin) chrysanthemumic acid were, respectively, 1.72, 1.12, 0.843 and 1.06 as toxic and 0.246, 0.172, 0.141 and 0.166 as effective in knockdown as allethrin alone.	**1:30 232. The Effect of Aerial Treatment with Sevin on Honey Bee Colonies. R. A. Morse, Dept. of Ent., N. Y. S. Coll. of Agr., Cornell Univ., Ithaca.** In the spring of 1959 the Plant Pest Control Division, USDA, sprayed 75,000 acres by air in central N. Y. Colonies in 5 locations were sprayed on different days. Depletion of the field force followed in several days and was recorded by means of a special trap.
1:42 233. The Utilization and Metabolism of 4-C^{14}-Cholesterol by the Adult House Fly. J. N. Kaplanis, W. E. Robbins and L. A. Tabor, Ent. Res. Div., ARS, USDA, Beltsville, Md. Only low levels of C^{14} compounds were excreted following injection of 4-C^{14}-cholesterol to female flies. Most of the administered material was utilized in egg production. The C^{14} compounds present in the adults and eggs were characterized by column chromatography and reverse isotope dilution.	**1:42 234. Seasonal Behavioral Variations of *Bembix nubilipennis* Cresson. C. S. Lin, Biol. Dept., Huston-Tillotson Coll., Austin 2, Tex.** The biology of a large colony of the solitary digger wasps was studied in Austin, Texas. The wasps show marked variations in their behavior pattern in early summer and early fall. Comparative data were obtained from 64 nests on burrow length, cell number and cell content.		**1:42 235. Control of Adult House Flies with Residual, Bait and Cord Applications of Insecticides. H. B. Weinburg, H. F. Schoof and J. W. Kilpatrick, Communicable Disease Center, Public Health Service, Savannah, Ga.** Bayer 29493 as a residual and as a liquid bait, and ronnel impregnated cords, showed the most promise for extended residual control in dairy barns and chicken ranches.	**1:42 236. Results of Recent Tests for Scale Control on Ornamental Plants. L. C. Kuitert, Dept. of Ent., Fla. Agr. Expt. Sta., Univ. of Fla., Gainesville.** Control of Florida wax scale, *Ceroplastes floridensis* Comst., tea scale, *Fiorinia theae* Green, and dictyospermum scale, *Chrysomphalus dictyospermi* (Morg.) was studied. Four scalicides were tested against tea scales infesting camellias. Dimethoate gave outstanding control of all stages of the scale as well as being an effective ovicide.
1:54 237. Lipids of Resistant House Flies. R. J. Barker and L. N. Edmunds, Jr., Insect Physiol. Lab., Ent. Res. Div., USDA, Beltsville, Md. Using silicic acid chromatography, lipids from 50 strains of house flies were separated into hydrocarbons, sterol esters, triglycerides, fatty acids, free sterols, diglycerides, monoglycerides, acetone soluble phospholipids and insoluble phospholipids. Using infrared spectra and chemical determinations, these fractions were explored for possible correlation of resistance to a particular lipid.	**1:54 238. Biology of the Clover Root Borer, *Hylastinus obscurus* (Marsh.), in Quebec. Jean Gustafson and F. O. Morrison, Macdonald Coll., Prov. of Quebec.** Adults change from negatively to positively geotropic after mating and flight. Females lay an average of 20 eggs and infest several plants. Development from egg to adult requires 62 to 66 days under Quebec conditions. Summer predatism and parasitism are practically non-existent.		**1:54 239. Laboratory Evaluation of Potential Compounds Against House Flies. J. W. Kilpatrick, G. C. Morris, III, and R. W. Fay, Communicable Disease Center, Public Health Service, Savannah, Ga.** In laboratory evaluations Bayer 29493 and Bayer 25141 have shown the most promise for residual and poison bait application. Bayer 29493 has shown considerable promise as a cord impregnant.	**1:54 240. Chemical Control of Slugs. A. J. Howitt, Western Wash. Expt. Sta., Puyallup.** Economic control of slugs affecting orchard-ladino pastures was achieved by bringing the slugs to the surface by irrigation, then treating with metaldehyde. Colloidal suspensions of metaldehyde were then pumped into the overhead irrigation sprinkler system. For slug control in garden crops, metaldehyde sprays and dusts were superior to baits.

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2:06 241. Preliminary Studies on Insect Sterols and Their Metabolism. H. C. Agarwal, G. G. Kapadia, J. E. Casida and S. D. Beck, Dept. of Ent., Univ. of Wisc., Madison 6. The metabolism of carbon-14-labeled cholesterol and cholesterol acetate was studied in the adult cockroach and house fly, and larvae of confused flour beetle. Sterols from the house fly were isolated and at least three compounds separated chromatographically. An attempt was made to characterize these sterols.	**2:06 242. The Effect of Land Use on Grasshopper Populations. R. D. Bird, CDA, Res. Sta., Winnipeg, Manitoba.** In eastern Manitoba draining, cultivation and road building have completely changed the vegetation. *Camnula pellucida* became a pest in 1900, following increase of *Agropyron smithii*, and *Melanoplus bivittatus* in 1932, with increase of broad leaved weeds. Continued disturbance is maintaining habitats for *M. bivittatus* but reducing them for *C. pellucida*.		**2:06 243. R-1207 and Dimethoate for Fly Control on Cattle. Tien-Hsi Cheng and D. E. H. Frear, Depts. of Zool. and Ent. and Agr. Biol. Chem., Pa. State Univ., University Park.** Dimethoate, R-1207 (3-chloropropyl *n*-octyl sulfoxide) and synergized pyrethrins were applied to beef and dairy cattle by means of automatic electric eye sprayers. Control was excellent for horn fly, good for stable fly, mediocre for house fly and Muscid fly. No adverse effect of treatment was observed.	**2:06 244. The Biology, Economic Importance and Control of the Barley Thrips, *Limothrips denticornis* Haliday. R. L. Post, Agr. Expt. Sta., N. D. Agr. Coll., Fargo.** Studies showed that two adult thrips per plant producing 30 young caused a reduction of 1% test weight, 11% plump and an increase of 2% thin kernels. This equals a $0.06 loss per bushel for malting barley and a decreased yield of 3 bushels per acre.
2:18 245. Lipogenesis from C^{14}-Acetate in the American Cockroach. S. J. Louloudes, J. N. Kaplanis, W. E. Robbins and R. E. Monroe, Ent. Res. Div., ARS, USDA, Beltsville, Md. The incorporation of radioactivity into the saponifiable and unsaponifiable fractions of male and female American cockroaches was determined following injection of 1-C^{14}-acetate. The unsaponifiable material was fractionated by chromatography and digitonin precipitation and the methyl esters of the fatty acids were analyzed by gas chromatography.	**2:18 246. Drinking and the Need for Water in Orthoptera. S. K. Gangwere, Biol. Dept., Wayne State Univ., Detroit 2, Mich.** During the course of research on feeding behavior of Orthoptera information was also obtained on drinking and the need for water in these insects. Data from laboratory experiments and from observations on individuals free in nature suggest that most Orthoptera obtain their water in unbound form from their foods.		**2:18 247. Insecticides and Application Methods for Control of the Sheep Ked. J. G. Matthysse and V. P. Castellano, N. Y. S. Coll. of Agr., Cornell Univ., Ithaca.** Diazinon, dieldrin, ronnel, Co-ral, dimethoate, lindane and DDT were effective as eradicants for sheep ked in farm flocks when applied as high gallonage, high pressure sprays. Application with a garden sprinkling can was equally effective utilizing Diazinon, ronnel or dieldrin.	**2:18 248. Laboratory Studies with Insecticides and the Walnut Husk Fly, *Rhagoletis completa* Cresson. M. M. Barnes and H. R. Moffitt, Univ. of Calif., Riverside.** Studies on breaking diapause by chilling made pre-season husk fly populations available for greenhouse studies. Residual effectiveness of 16 insecticides was studied in combination with Staley's Protein Bait No. 7. Flies were caged on treated walnut seedlings for 24-hour periods at lengthening intervals after treatment.
2:30 249. The Phospholipids of the American Cockroach, *Periplaneta americana* L. A. N. Siakotos and H. Zoller, Army Chem. Center, Maryland. The phospholipids of cockroach tissues have been separated and identified by various paper chromatographic techniques. These phospholipids include phosphatidic acid, phosphatidyl choline, phosphatidyl ethanolamine, phosphoinositide, cerebrosides, sphingomyelin, lysolecithin and plasmalogen.	**2:30 250. Survival, Fecundity, and Population Growth of *Melanoplus bilituratus* (Wlk.) (Orthoptera) in Relation to Date of Hatching. R. Pickford, CDA Res. Sta., Univ. Sub P. O., Saskatoon, Sask.** Survival and fecundity of *M. bilituratus* in field cages decreased progressively as hatching occurred later in the season. Mortality was highest during the early nymphal stage and lowest in the early adult stage. Fecundity was highest during mid-summer and decreased as temperatures declined during the fall.		**2:30 251. The Toxicity of Organic Phosphorus Insecticides to Horses. J. B. Jackson, L. M. Hunt, R. D. Radeleff and R. O. Drummond, USDA, Animal Disease and Parasite Res. Div., Kerrville, Tex.** Forty-eight horses were treated with 8 organic phosphorus compounds administered by stomach tube, mixed in feed and by intramuscular injection. Whole blood cholinesterase determinations were made for each animal. Three compounds produced toxicity in four animals.	**2:30 252. The Evaluation of Insecticides for Control of the Onion Maggot, *Hylemya antiqua* (Meig.), and Their Effects on Plant Development. Gordon Guyer and Arthur Wells, Mich. State Univ., East Lansing.** Twenty-three materials were evaluated for control of chlorinated hydrocarbon resistant onion maggots at 5 locations in Michigan. Infestations, onion yields and resulting phytotoxicity problems were evaluated. The effects on plant stands and subsequent development of onion seedlings were correlated with variations in moisture, temperature, soil type and varieties.

moisture, temperature, soil type and varieties.

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2:42 253. Carbohydrate Composition of Roach Plasma Glycoproteins. H. Lipke, M. M. Grainger and A. N. Siakotos, Army Chem. Center, Maryland. Levels of protein-bound carbohydrates in the plasma of *Periplaneta* have been determined. The free and bound hexosamine, neutral sugar and uronic acids of the blood were measured during the formation of the new cuticle. The relation of these levels to the changes occurring in specific plasma glycoproteins will be discussed.	**2:42 254. Some Mortality Factors in a Grasshopper Population. L. J. Mook and D. M. Davies, McMaster Univ., Hamilton, Ont.** The effect of mortality factors, emphasizing predation on a population at low densities, is discussed: The relative importance of predators, including birds, small mammals and praying mantids, is assessed with the aid of radioactive phosphorus.		**2:42 255. Duration of Efficacy of Dieldrin in the Control of the Mite Vectors of Scrub Typhus in Malaya. Robert Traub, U. S. Army Med. Res. Unit (Malaya), and M. A. C. Dowling, The Royal Army Med. Corps, c/o Dir. of Med. Services, FARELF, Land Forces, Singapore.** Experiments have shown that dieldrin, applied to the ground at the rate of 2.5 pounds per acre, effectively controlled the chiggers, *Leptotrombidium akamushi* and *Leptotrombidium deliensis*, for more than two years. Ninety-four per cent reduction in the number of chiggers per wild rat was found 113 weeks after application.	**2:42 256. Tobacco Wireworm Control with Row Treatments of Insecticides. F. E. Guthrie, W. E. Splinter and R. L. Rabb, N. C. State Coll., Raleigh.** Studies conducted from 1956 through 1959 indicate that wireworms can be controlled by row treatments with insecticides provided adequate mixing of the toxicant is attained. Several methods of mixing the insecticide in the row with conventional equipment and during normal agronomic practices of tobacco production are discussed.
2:54 257. A Study of Sugars Found in Tobacco as Affected by the Green Peach Aphid, *Myzus persicae* (Sulz.), and Its Honeydew. R. L. Baron and F. E. Guthrie, N. C. State Coll., Raleigh. Aphid infestations reduced the sugar content of the plant. Analysis of honeydew showed the presence of 3, and possibly 4, oligosaccharides which were tentatively identified as gluco-sucrose, malto-sucrose, and maltotrio-sucrose. The aphid apparently removed glucose from the plant sap and converted it to the oligosaccharides.	**2:54 258. Studies on the Nutrition of the Strawberry Spider Mite. W. N. Cannon, Jr., and W. A. Connell, Univ. of Del., Newark.** *Tetranychus atlanticus* females were isolated in petri dishes on leaf discs from soybean plants grown in sand culture with nutrient solutions in which N, P and K were varied. Progeny in 10 days was used as an index of the effect of plant nutrient level on rate of mite population increase.		**2:54 259. Bacterial Indicators of Differences in Two Strains of House Flies. J. L. Zaharis, Ent. Dept., Kan. State Univ., Manhattan.** A violet color-producing bacterium associated with an insecticide-resistant strain and its absence in an insecticide-susceptible strain, accompanied by a butter-yellow bacterium, normally found on watering dishes of the latter, are under investigation. The yellow organism inhibits appearance of the violet color. Other biological differences are apparent.	**2:54 260. Chemical Control of the Raspberry Root Borer, *Bembecia marginata* (Harr.), on Loganberry in British Columbia. J. Raine and H. Andison, Ent. Lab., Res. Branch, CDA, Parliament Bldgs., Victoria, B. C.** Drenches of Diazinon, lindane, phorate, 12008, Sevin, NC262 or Phosdrin were applied in spring or fall to loganberry crowns against early-instar overwintering larvae in hibernacula or bark. Infestations were reduced to between 0 and 10 per cent of crowns, compared to 77 per cent or more for the untreated.

3:06 **RECESS**

B. Physiol. & Toxicol. Chairman: R. D. O'Brien Grand Ballroom	C-d. Ecology & Bionomics Chairman: R. F. Morris English Room	Symposia No.	D. Medical & Vet. Chairman: A. W. A. Brown Reception Room	F. Chemical Control Chairman: H. Hurtig Crystal Ballroom
3:18 261. The Effects of Maleic Hydrazide Treated Broad Beans on the Pea Aphid. A. G. Robinson, Dept. of Ent., Univ. of Manitoba, Winnipeg. Pea aphids, *Macrosiphum pisi* (Harr.), were caged on broad beans which had been treated at 4,000 p.p.m. of the plant growth regulator maleic hydrazide. Fecundity was greatly reduced; most nymphs died in the first instar. Contact sprays with MH on adult aphids were not insecticidal and did not reduce fecundity.	**3:18 262. Sampling Methods Used to Determine Losses of Flue-Cured Tobacco Caused by Hornworms and Budworms. M. H. Farrier and A. L. Finkner, N. C. State Coll., Raleigh.** Class frequency and time analysis of 1958 data showed different sampling methods are necessary for efficient loss surveys following first and second broods of hornworms. Flue-cured tobacco foliage losses caused by hornworms and budworms in 1959 were recorded.		**3:18 263. Control of Adult Black Flies in the Forests of Eastern Canada by Aircraft Spraying. D. G. Peterson, Ent. Lab., CDA, Guelph, Ont., and A. S. West, Dept. Biol., Queen's Univ., Kingston, Ont.** In 1954, an 11% solution of DDT applied by aircraft to 6.7 sq. mi., at 0.19 lb. of DDT per acre, significantly reduced the adult black fly population. A similar application in 1956, at 0.22 lb. per acre, reduced the number of black flies for more than 10 days.	**3:18 264. Performance of Chlorinated Hydrocarbon and Phosphate Insecticides with Seasonal Development of European Pine Shoot Moth, *Rhyacionia buoliana* (Schiff.). J. W. Butcher and D. L. Haynes, Dept. of Ent., Mich. State Univ., East Lansing.** Early work on control of European pine shoot moth in pine plantations suggested that timing of insecticides was less critical in the spring than in summer. Improved sampling techniques and methods of analysis were used in 1958–59. The effectiveness of chlorinated hydrocarbon and phosphate compounds was related to insect development.
3:30 265. Feeding and Excretion by the Pea Aphid, *Acyrthosiphon pisum* (Harr.), Reared on Varieties of Peas. J. L. Auclair, Res. Lab., CDA, St. Jean, Que. Rate of aphid feeding and excretion was generally proportional to susceptibility of host variety, but a greater proportion of material ingested was excreted and a lesser proportion assimilated on susceptible hosts. Honeydew excreted on susceptible hosts contained a slightly higher concentration of amino acids and amides.			**3:30 266. Control of Black Fly Larvae in the Forests of Eastern Canada by Aircraft Spraying. A. S. West, Dept. Biol., Queen's Univ., Kingston, Ont., A. W. A. Brown, Dept. Zool., U.W.O., London, Ont., and D. G. Peterson, Ent. Lab., CDA, Guelph, Ont.** Aircraft application of 4 lbs. of DDT per flight mi. eliminated black fly larvae from streams within a treated plot. A 64.5 sq. mi. drainage basin was treated with 10.6 to 29.9 lbs. of DDT per flight mi. Larvae were eliminated, or failed to appear, in all but one of 65 streams sampled.	**3:30 267. *Hyperodes humilis* (Gyll.), A New Pest of Sweet Corn in the Everglades, and Its Control. E. D. Harris, Everglades Expt. Sta., Belle Glade, Fla.** Eggs are embedded in the lower leaf sheaths or coleoptile of young plants. Larvae mine the lower stem and plants become stunted, wilted, or lodged, and often die. About one month passes between oviposition and adult emergence. DDT and Guthion were the only effective insecticides among several tested.
3:42 268. The Effects of a Mixture of Royal Jelly, Yeast and Liver Extracts, and of the D-Amino Acids on the Growth of the Pea Aphid, *Acyrthosiphon pisum* (Harr.). J. B. Maltais and J. L. Auclair, Res. Lab., CDA, St. Jean, Que. Using the method of feeding the pea aphid on plant cuttings in organic nutrient solutions (Maltais 1959), beneficial effects on aphid growth were obtained with an aqueous mixture of royal jelly, yeast and liver extracts, and deleterious effects with a solution of 12 D-amino acids and D-asparagine.			**3:42 269. Nematode Parasitism of Black Fly Larvae in Wisconsin. J. R. Anderson and G. R. DeFoliart, Dept. of Ent., Univ. of Wisc., Madison.** The larviform stage of a mermithid nematode was found infesting 11 species of simuliid larvae. Field and laboratory observations revealed that infested larvae were prevented from pupating and eventually perished. Nematodes were present in 10% of streams investigated. The incidence of parasitism reached 85% in some populations.	**3:42 270. Problems Associated With the Control of Mint Insects. G. E. Gould, Purdue Univ., Dept. of Ent., Lafayette, Ind.** Sixty insect species infest peppermint and spearmint in Indiana. Only cutworms and the mint looper, *Raphoplusia ou* (Gn.), have been serious in the past 10 years. Dieldrin and heptachlor were superior to DDT against the looper in the field. High chemical residues in the oil have prevented registration for use.

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royal jelly, yeast and liver extracts, and deleterious effects with a solution of 12 D-amino acids and D-asparagine.

streams investigated. The incidence of parasitism reached 85% in some populations.

tion for use.

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B. Physiol. & Toxicol. Chairman: R. D. O'Brien Grand Ballroom

3:54 271. Sulfate Utilization and the Role of Intracellular Symbionts in Cockroaches (Orthoptera: Blattidae). S. M. Henry and R. J. Block, Boyce Thompson Inst. for Plant Res., Inc., Yonkers, N. Y.

S^{35} sodium sulfate administered to cockroaches was converted to cysteine, glutathione, methionine, methionine sulfoxide, taurine, sulfite, and three unidentified compounds. No qualitative differences were found in the sulfate metabolism of normal and aseptically reared *B. germanica*. Sulfite was only labeled substance identified in tissue of this species freed of intracellular symbionts with aureomycin.

4:06 274. Larval Foregut Activity as Studied Electrographically in *Galleria*. R. L. Beard, The Conn. Agr. Expt. Sta., New Haven.

Foregut (visceral) activity was in contrast to somatic neuromuscular physiology. Electrograms registered independent, integrated, or disorganized activity in contraction centers localized in three regions of the foregut as affected by physical and chemical agents. Presumptive evidence suggested the ingluvial ganglion as an important center for visceral reflexes.

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D. Medical & Vet. Chairman: A. W. A. Brown Reception Room

3:54 272. Control of *Myocoptes musculinus* (Koch) on Guinea Pigs. H. G. Sengbusch, State Univ. of N. Y., Coll. of Ed., Buffalo 22.

Laboratory guinea pigs infested with myocoptic mange mites were treated with either a 50% ethyl alcohol solution of 0.2% DMC or a 2% concentration of Aramite plus a liquid detergent. Both treatments were effective.

4:06 275. Paper withdrawn.

F. Chemical Control Chairman: H. Hurtig Crystal Ballroom

3:54 273. Aphid Control Tests on Potatoes. D. O. Wolfenbarger, Sub-Tropical Expt. Sta., Univ. of Fla., Homestead.

Results are given from 14 years of study on control of the green peach aphid, *Myzus persicae* (Sulz.), on potatoes. Control of the aphid was often achieved initially and effectively with an insecticide, only to be reduced within a few years so that it was superseded by another toxicant.

B. PHYSIOL. AND TOXICOL.
Grand Ballroom

4:18 276. Amoeboid Motion of Hemocytes in Wing Veins of the Cockroach *Blaberus giganteus* L. J. W. Arnold, Ent. Res. Inst., CDA, Ottawa, Ont.

Hemocytes with finely granular cytoplasm were observed to move independently in wing veins of the giant cockroach. They moved in typical amoeboid fashion and also by means of hyaline, filiform pseudopodia. Other cell types were less active. Movement was most frequent and prolonged where blood circulation was retarded.

4:30 277. A Phase Contrast Study of the Hemocytes of *Rhodnius prolixus* Stal. R. C. Ballard, Dept. Biol., San Jose State Coll., San Jose, Calif., and J. C. Jones, Dept. Ent., Univ. Md., College Park.

Unfixed hemolymph examined with phase contains six distinct types of cells in *Rhodnius*: prohemocytes, plasmatocytes, oenocytoids, granular hemocytes, cystocytes and adipohemocytes. Preliminary findings indicate phagocytosis is a poor criterion for classifying cells. Cystocytes are not associated with coagulation islands. Quantitative changes in blood picture with molting are presented.

4:42 278. The Effect of Nitrogen Nutrition on Susceptibility of *Drosophila melanogaster* (Meig.) to Contact Poisoning with DDT. C. T. Rivera and A. L. Steinhauer, Univ. of Maryland, Dept. of Ent., College Park.

D. melanogaster larvae were reared on a chemically defined medium. The molecular nitrogen content was adjusted to five levels, and the adult flies reared from these different media were tested for DDT susceptibility by a contact method. The results indicate decreased susceptibility to DDT with increased nitrogen in the diet.

4:54 279. Irritation of Mosquitoes by Contact with DDT and Their Avoiding Reactions. Otto Hecht, Nat. Comm. of Malaria Eradication, Mexico, D. F.

The irritation of anophelines produced by contact with DDT-treated surfaces was measured, and mean irritative dose, level of irritability, mean irritative minimum dose, and the threshold of irritation established. The relation between irritability and susceptibility to the knockdown action was studied; also the irritation by other contact insecticides.

B. PHYSIOL. AND TOXICOL. (Continued)

Grand Ballroom

5:06 280. Effect of Gamma Irradiation on the Boll Weevil. T. B. Davich and D. A. Lindquist, USDA, ARS, College Station, Texas.

Boll weevil adults, pupae, and eggs have been exposed to various doses of gamma irradiation. Male boll weevils were sterilized with a dose of about 15,000 roentgens, however, extremely high mortality resulted.

5:18 281. Analog-Synergism Between Carbamate Insecticides on the House Fly and the German Roach. H. T. Gordon and M. E. Eldefrawi, Dept. of Ent. and Parasit., Univ. of Calif., Berkeley.

A mixture of Dimetilan and Sevin is more toxic to house flies than either carbamate alone, and a mixture of Isolan and Sevin is more toxic to German cockroaches. Synergism may increase the toxicity of Sevin by protecting it from rapid hydrolysis by "carbamate esterase" (possibly cholinesterase).

ADDENDUM

The following papers which were received after the program was in press will be scheduled at the convenience of section co-chairmen.

Sect. A. Taxonomy of California Mealybugs, and Discussion of New Species. H. L. McKenzie, Dept. of Ent., Univ. of Cal., Davis.

Some fundamental evaluations of certain morphological characteristics of adult female pseudococcids have developed as a result of this investigation. Twenty-six new California mealybugs have been described, some of which appear to be of economic concern. Certain subterranean species feed effectively at soil depths of six feet.

Sect. A. Aphid Fauna of the Subfamily *Panaphinae* (Aphidae, Homoptera). A. A. Granovsky, Dept. of Ent. and Econ. Zool., Univ. of Minn., St. Paul 1.

The phylogenetic limits of this subfamily are expressed morphologically into four separate groups, characterized by peculiar clavate cauda, usually dented anal plates, truncate cornicles, frequent dorsal tubercles, specific chaetotaxy, and maculation. Biologically they are non-migratory on deciduous trees, sedges, and legumes. A monograph of world species is in preparation.

Sect. A. The Function of Sound in Hemiptera and Homoptera. Thomas Moore, Univ. of Mich., Ann Arbor.

Sound recordings will be used to illustrate discussion.

Sect. B. Comparative Bioassay to Qualitatively Determine Pesticides. R. F. Harwood and Sutharm Areekul, Wash. State Univ., Pullman.

Toxicity curves were developed for 29 toxicants against four organisms. Using the LD_{50} level of a given toxicant for one organism as a basic dose for three remaining organisms, yields a mortality response characteristic for the toxicant, or for a narrowly limited group of toxicants.

Sect. C-b. The Relationship of Sound Production During the Waggle Dance of the Honey Bee to the Distance of the Food Source. A. M. Wenner, Dept. of Zool., Univ. of Mich., Ann Arbor.

Tape recordings and audiospectrographs have been made of sounds produced during waggle dances of honey bees to determine any correlation between distance of the food source and sound production during the straight run of the dance. The sound is not produced by the waggling of the abdomen.

Sect. C-d. The Malaise Trap as a Method of Sampling Flying Insects. Henry Townes, Museum of Zool., Univ. of Mich., Ann Arbor.

The Malaise trap is a tent-like structure of fine netting. Average catch is about 1,000 insects a day, mostly Hymenoptera, Diptera, and Lepidoptera. The trap is useful in taking comparable samples, either to find the seasonal occurrence of a species or to compare different habitats.

Sound recordings will be used to illustrate discussion.

seasonal occurrence of a species or to compare different habitats.

ADDENDUM (Continued)

Sect. D. Patterns of Bacterial Survival in Developing Muscoid Flies. Bernard Greenberg, Univ. of Ill., Coll. Pharmacy, Chicago.

A quantitative study has been made of the effect of metamorphosis on the normal flora of several species of blow flies and *Muscina stabulans*. The magnitude and other characteristics of infection of the pre-adult and adult stages of these species are compared with the house fly and a general survival pattern extrapolated.

Sect. D. Evidence of Human Body Louse Resistance to DDT and Lindane as Observed in Studies Along the U. S.-Mexican Border. W. F. Buren and J. H. Hughes, Div. of Foreign Quarantine, U. S. Public Health Service, El Paso, Texas, and Washington, D. C.

Preliminary studies on the human body louse, *Pediculus humanus humanus* L., conducted along the U. S.-Mexican Border, have provided some evidence of resistance to DDT and to Lindane.

Sect. E-b. Methods of Pink Bollworm Detection in California. F. L. Blanc, Cal. State Dept. of Agr., S. M. Klopfer and N. O. Berry, Plant Pest Control Div., Sacramento.

The discovery of the pink bollworm in Central Arizona in July, 1958, caused considerable concern lest a similar but undisclosed infestation might not also exist in California. Detection methods employed will be illustrated and discussed.

Sect. F. Sampling Forage Crops for Determination of Insecticide Residues. E. W. Huddleston, G. G. Gyrisco, T. W. Kerr, Jr., D. J. Lisk, and K. H. Thompson, Coll. of Agr., Cornell Univ., Ithaca.

The data presented are the results of a series of uniformity trials and variance component analysis experiments using methoxychlor-treated alfalfa. Based on these data, a recommendation is given for sampling rates, plot sizes, and experimental design.

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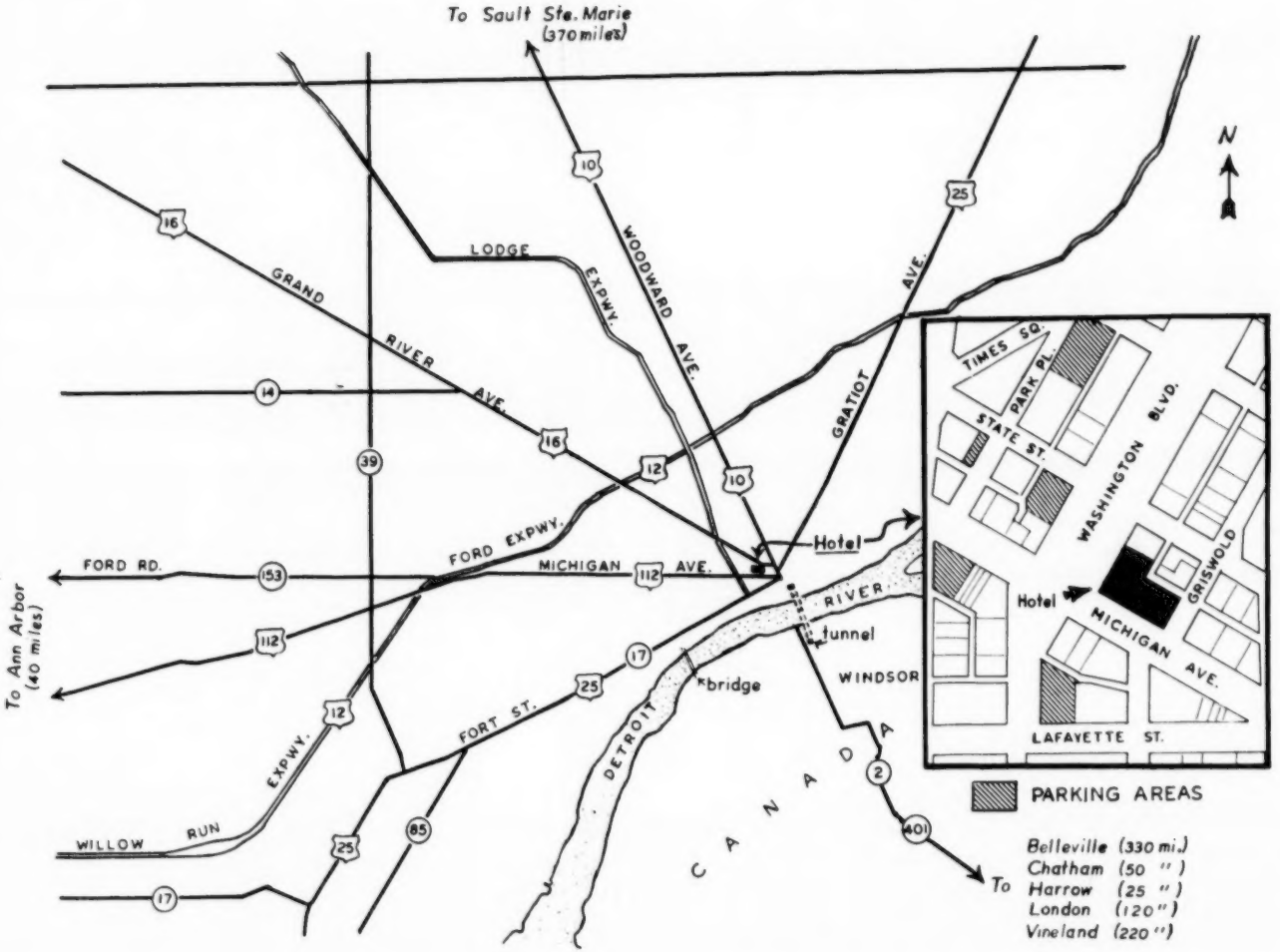

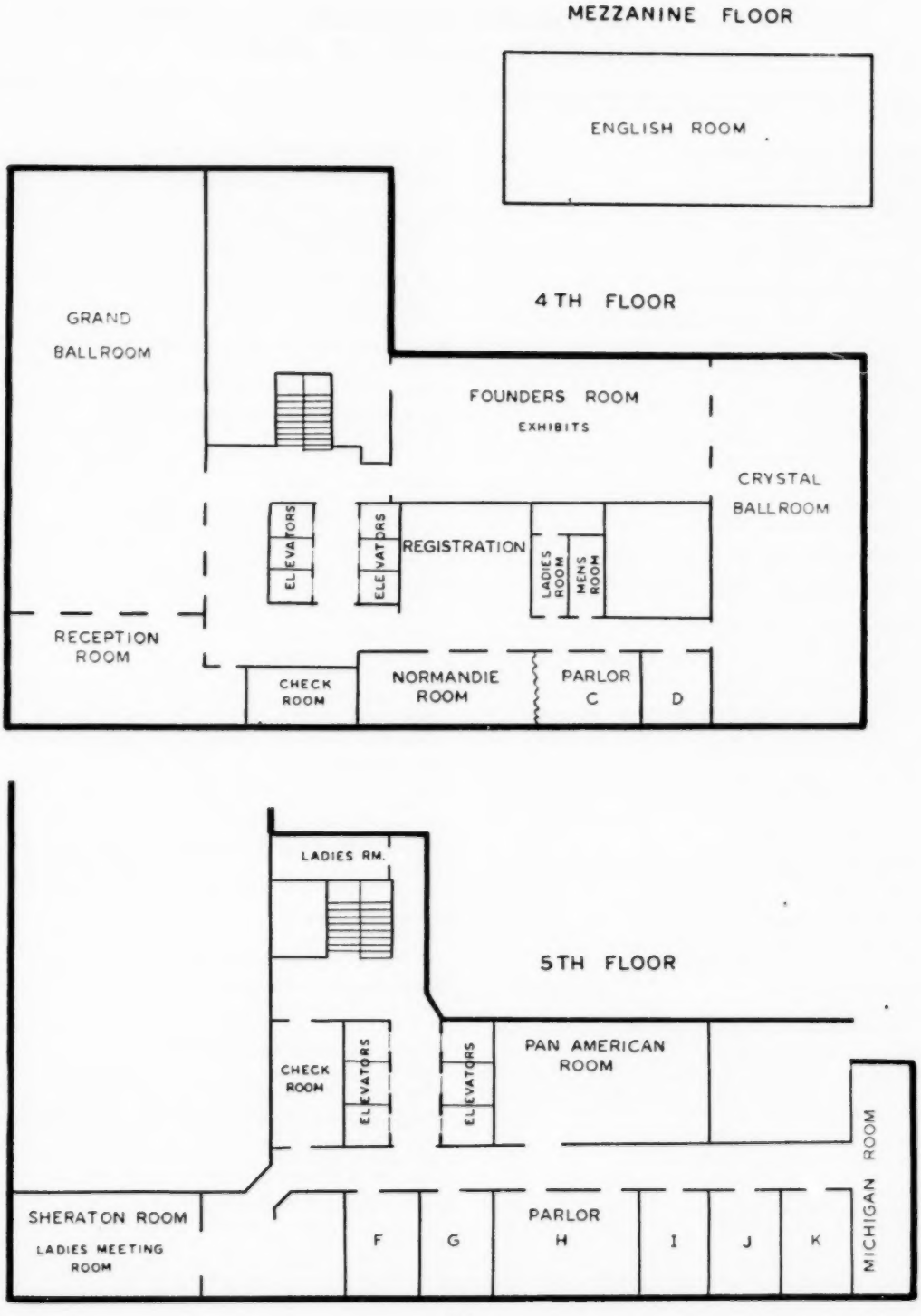
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RECEPTION ROOM
CHECK ROOM
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SUSTAINING ASSOCIATES
ENTOMOLOGICAL SOCIETY OF AMERICA

The firms and institutions listed here are proudly acknowledged as Sustaining Associates of this Society. We commend these Associates to the attention of our members.

American Cyanamid Company
Agricultural Division
30 Rockefeller Plaza
New York 20, N. Y. 1955–59

Bioferm Corporation
Wasco, California 1959

California Spray-Chemical Corp.
Executive Offices
Richmond, California & Washington, D. C. 1956–59

Chemagro Corporation
Hawthorn Road
P. O. Box 4913
Kansas City 20, Missouri 1955–59

Colloidal Products Corporation
100 Gate 5 Road
Sausalito, California 1956–59

Dow Chemical Company
Midland, Michigan 1956–59

E. I. DuPont De Nemours Company, Inc.
Grasselli Chemicals Department
Wilmington 98, Delaware 1955–59

Eastern States Farmers' Exchange, Inc.
26 Central Street
West Springfield, Massachusetts 1956–59

Freeport Sulphur Company
16th Floor Commerce Building
New Orleans 5, Louisiana 1957–59

Geigy Agricultural Chemicals
Division of Geigy Chemical Corp.
Saw Mill River Road
Ardsley, New York 1956, 1959

General Chemical Division
Allied Chemical Corporation
40 Rector Street
New York 6, N. Y. 1955–59

G. L. F. Soil Building Service
Division of Coop. G. L. F. Exchange, Inc.
Ithaca, New York 1955–59

Gulf Oil Corporation
Gulf Building
Pittsburgh 30, Pennsylvania 1955–59

Hercules Powder Company
Agricultural Chemicals Division
Naval Stores Department
Wilmington, Delaware 1955–59

Jackson & Perkins Company
Newark, New York 1955–57, 59

Eli Lilly and Company
Agricultural Research Center
Greenfield, Indiana 1959

McLaughlin Gormley King Co.
1715 Fifth Street, S. E.
Minneapolis 14, Minnesota 1959

Monsanto Chemical Company
800 N. Lindbergh Boulevard
St. Louis 66, Missouri 1956–59

S. B. Penick & Company
100 Church Street
New York 8, N. Y. 1955–59

Pennsylvania Farm Bureau Cooperative Association
3609 Derry Street
Harrisburg, Pennsylvania 1955–59

Port Fertilizer & Chemical Company
P. O. Box 337
Los Fresnos, Texas 1955–59

Rohm & Haas Company
222 W. Washington Square
Philadelphia 5, Pennsylvania 1955–59

Shell Chemical Corporation
Agricultural Chemical Sales Division
460 Park Avenue
New York 22, N. Y. 1955–59

Spraying Systems Company
3201 Randolph Street
Bellwood, Illinois 1959

Stauffer Chemical Company
380 Madison Avenue
New York 17, N. Y. 1955–59

Swift & Company
Agricultural Chemical Division
Union Stock Yards
Chicago 9, Illinois 1958–59

Union Carbide Chemicals Company
30 East 42nd Street
New York 17, N. Y. 1956–59

United Fruit Company
80 Federal Street
Boston, Massachusetts 1955–59

Velsicol Chemical Corporation
330 East Grand Avenue
Chicago 11, Illinois 1955–59

Wil-Kil Exterminator Company, Inc.
522 W. North Avenue
Milwaukee 12, Wisconsin 1959

Wisconsin Alumni Research Foundation
Insecticide Testing Laboratory
506 N Walnut Street
Madison 5, Wisconsin 1958–59

Woolfolk Chemical Works, Ltd.
Ft. Valley, Georgia 1956–59

Entomological Notes from the Aloha State

By D. T. Fullaway

Board of Agriculture and Forestry, Honolulu, Hawaii

With the agitation for statchood, affirmations and denials of worthiness and similar comments, there has been much soul-searching on the part of the Hawaiian electorate and probably some serious doubts of our fitness because of our polygenetic population. However we may think about it isn't it really amazing that in less than two centuries the Hawaiians have progressed from savagery to a high level of civilization and that the islands now constitute the fiftieth state? This transformation began with the arrival of Caucasians such as explorers, seamen, merchants and missionaries but would probably never have happened if the migration had not been to establish permanent settlements with a subsequent mixture of races and scrambling of genes. These thoughts have run through the writer's mind in an attempt to trace the history of entomology in Hawaii. It is believed that the initial studies of our insects were culturally motivated. Capt. Cook, in his two expeditions to the Pacific, is known to have had a naturalist in the ship's company. As a matter of fact, the oldest known insect specimen from Hawaii was collected on Kauai while Cook's ship lay at anchor off the mouth of the Waimea River and this specimen eventually got into the Banksian Collection in the British Museum. Also, for ten years in the eighties (1880–1889) Canon Thomas Blackburn, a clergyman of the Church of England, served the Church in Honolulu and employed his leisure moments in collecting insects in the forests behind Honolulu and at other places in the islands. These insects were for the most part sent to London for study and awakened the interest of the members of the Royal Soceity of London and the British Association for the Advancement of Science. Later this led to the organization of a project for the study of the fauna of the Hawaiian Islands co-sponsored by these institutions and the Bernice Pauahi Bishop Museum at Honolulu. Dr. R. C. L. Perkins, an Oxford graduate, was sent to the islands to conduct this survey and spent twenty years on the project which resulted in the publication in 1913 of the *Fauna Hawaiiensis*. At that time the British Empire was very extensive and the statement was current that "the sun never sets on the British flag." It was equally true that it never set on British naturalists who were constantly busy promoting the national cultural aims. Some of these workers personally known to the writer are T. Bainbrigge Fletcher, Lepidopterist at the Pusa (Bihar) Hill Station in India, A. E. Wileman, another Lepidopterist, who was for many years British Consul in Formosa (Taiwan) and Henry Tryon, Government Entomologist, Queensland, Australia. But to get back to the history of entomology in Hawaii. While the initial motivation for the study of the fauna was cultural, there later came a time when it was more utilitarian. With the development of agriculture in the form of sugar cane, coffee and pineapple cultivation as well as the importation of plant materials, the occurrence of insect and disease outbreaks was a foregone conclusion. The first came in 1902 with the appearance of a strange leafhopper, which increased so rapidly that its effect was almost devastating to the sugar cane fields. At that time in addition to Dr. Perkins there were other entomologists in the islands, notably Albert Koebele,[1] Jacob Kotinsky and D. L. Van Dine. To meet the leafhopper situation it was decided by the Sugar Planters' Association that they required an experiment station under their own direction with a full staff. This was hastily assembled to study the problem and was named the Hawaiian Sugar Planters' Association Experiment Station. The engagement of O. H. Swezey, a student of the leafhoppers at the University of Ohio, George W. Kirkaldy, another student of Hemipetra, and Fred Terry, a preparator at the British Museum of Natural History and a student of Diptera, soon followed. These men along with Kotinsky and Van Dine and a few other interested persons were the founders of the Hawaiian Entomological Society in 1904. This society holds monthly meetings which have been mostly at the H.S.P.A. Experiment Station because of its central location. The Society has held over 640 meetings to date and has published 16 volumes of its proceedings. Membership has included all the working entomologists in the islands and has at times numbered more than one hundred. Its members include the entomologists at the Pineapple Experiment Station, the University of Hawaii, the Bishop Museum and a number of nonprofessionals. The main interests over the years have been Pacific exploration, biological control, ecology, virology and the classification and description of all the principal orders of insects.

[1] Koebele was charmingly discussed by R. L. Doutt in the paper *Vice, Virtue and Vedalia*, December 1958 Bulletin of the Entomological Society of America.

NOTICE TO MEMBERS

CONSTITUTION

Your attention is called to Item 8 of the minutes of the Final Business Meeting (Salt Lake City meetings) on pages 17 and 18 of the March 1959 Bulletin. The action reported there on a proposed amendment of Article XII of the Constitution meets the requirements of the first sentence of Section 1 of Article XII of the present constitution. The special committee required by the second sentence of that Section was appointed as reported in the cited minutes. This committee has prepared its recommendations and these will be reported at the annual meeting in Detroit. Please reread the present Article XII of the Constitution, and the proposed amendment in the Bulletin as cited above and be prepared to act on the committee's report at the Detroit meeting.

BY-LAWS

The By-Laws of the Society, as distinct from the Constitution, have the following provision.

ARTICLE X

Amendments to By-Laws

Section 1. Changes in these By-Laws may be made by a two-thirds vote of any meeting or by a two-thirds majority of all votes cast in a mail ballot: Provided, that notice in writing of the proposed amendment shall have been sent to every active member at least one month before the date of the meeting at which it is

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to be considered, or the last date for the receipt of the ballots in case of mail vote.

The purpose of bringing this to your attention is to furnish all active members, as required in Article X, notice of two proposed amendments. No deletions are involved. The proposed amendments are given below in italics as added material to the present quoted Article and Sections.

ARTICLE V

Publications

Section 2. Editorial Boards. (Sentence two.) Each Editorial Board shall recommend to the Governing Board policies affecting the publication for which it is responsible, and shall select the Editor for the publication involved, who shall serve for a term of five years *unless otherwise specified.* (Three words added)

Section 7. Entoma (Sentence one.) Entoma is a directory of manufacturers of insecticides, fungicides, spray equipment, and other items of interest in connection with pest control. *The Editor of Entoma shall serve for four years.* (New sentence inserted)

The amendments noted above were proposed by the Entoma Editorial Board and were approved by a mail vote of the Governing Board. In accordance with Article X quoted above the amendments are hereby sent to all active members and will be considered at the Detroit meeting.

The reason for the proposed change of the Entoma Editor's term from five to four years is as follows. Entoma is issued biennially and on the odd years. Dr. E. H. Fisher has agreed to accept another term as Editor beginning in 1960. By adopting the amendments, the Editor's new term and that of each succeeding Editor will begin a full year in advance of an edition of Entoma and will end with the completion of an edition. Each four year term will span two editions.

FROM THE MANAGING EDITOR'S DESK

REVIEWING MANUSCRIPTS.—All manuscripts to be published in the ANNALS, the JOURNAL, or the MISCELLANEOUS PUBLICATIONS must meet certain standards of style and context if we are to maintain the high professional qualities of our journals. This requirement can best be enforced by the referee system by which each manuscript is submitted for critical review to one or two authorities in the particular field concerned. (Such a system has been brought to a high degree of perfection by the American Chemical Society and has resulted in their publications having enormous prestige and distinction.)

The above paragraph was taken from the Report of the *Editorial Policy and Procedures Committee* (adopted by the Governing Board; see BULL. ENT. SOC. AMERICA 4(1):24–25. 1958) recommending that the referee system of manuscript approval be instituted by our Society for the accomplishment of suitably critical reviews of *all* manuscripts submitted for publication.

Previously, most manuscripts submitted for publication in the JOURNAL OF ECONOMIC ENTOMOLOGY had been sent for review when appropriate reviewers were known and available. A comparatively brief report on how contributors reacted to the adoption of this procedure, together with some points in dealing with it, would seem to be of sufficient interest to be included here.

Right or wrong, it has been our policy to withhold the names of reviewers when the comments are transmitted to the contributors but the reviewers understand that their names will be revealed to the contributors if requested. In only a few instances (usually when policy or style was involved) have contributors been required to adopt any changes without agreeing that their manuscripts were improved thereby.

Obviously some reviewers, although trying to make helpful comments, do not have time at the moment to make a really careful review. This fact sometimes results in a misunderstanding of what the author means to say and may bring comments of no help to the author, leaving the impression that the reviewer doesn't know enough about the subject matter to give a competent review. The reviewer's primary responsibility is to determine the acceptability of the manuscript for publication by assessing its scientific merits. His secondary responsibility is to recommend, when necessary, constructive ways of improving the presentation. Space is not available here for discussing hints for writing an effective review, the importance of which is not easily overemphasized.

It is regretted that too much delay in obtaining reviews is sometimes unavoidable because the reviewer's schedule was unexpectedly changed or for some unexplained reason. For the most part a very good record has been established in this regard.

Rarely have the comments of reviewers been received with displeasure (either expressed or implied) by contributors who consider their work infallible or their words sacred. Most authors greatly appreciate the helpful comments received and many wish this fact made known to the respective reviewers. One contributor even sent a letter of appreciation for transmittal to the reviewer. A few comments, representative of the many favorable ones received, are quoted below:

"Once again I should like to extend our thanks to the reviewers for their very thorough and helpful criticisms."

"Your reviewers' suggestions are certainly pertinent. The JOURNAL is to be congratulated on having the services of reviewers so evidently well qualified."

"It is most encouraging to have a constructive criticism such as the one made by the reviewer to whom you sent my manuscript on. . . . In accordance with his suggestions we have rewritten the first paragraph."

"I am grateful for your reviewer's comments. It has been my previous experience in writing scientific articles that, however carefully a paper was prepared and edited, some glaring fault or omission remained to be discovered by editors or reviewers. The present paper is apparently no exception."

"Although I wasn't pleased with the prospect of revising this paper, nevertheless I am glad to see the review system put into effect for Journal articles. No matter how carefully one prepares a paper and no matter how many times a paper is reviewed and revised, additional reviews will disclose points that should be clarified. An author can never be a good judge of whether the paper he has written can be understood by other people. Too often, reviewers on the local level do little more than check for errors in spelling and grammar and give little thought to whether the data and conclusions are valid. This review system may result in some ruffled feelings but I'm sure that it will improve the quality of papers printed in the JOURNAL."

A few members have unselfishly volunteered to review papers dealing with their special fields of interest. Many more such volunteers would be welcomed as they are needed to relieve some of our presently overworked reviewers who are such unsung heroes in obtaining gradual improvement in the content of the Society's publications. We are indebted to many of them for much more than a hearty vote of thanks!

REDACTORY SERVICES.—In the *A. I. B. S. Bulletin* for April, 1959 the appointment of Mr. Francis C. Harwood as Director of Publications for the American Institute of Biological Sciences was announced. Among the duties assigned to Mr. Harwood was one of exploring the possibility of having AIBS furnish what he calls redactory services to a number of its member societies in issuing their journals. These services involve routine editing after the subject editor has completed his editing of the manuscripts, and the handling of all proof with the printer.

During August our Society was approached on this matter and a preliminary experiment is now underway in having AIBS furnish this service for the JOURNAL OF ECONOMIC ENTOMOLOGY. All business services on the JOURNAL will continue to be handled in the office of the Executive Secretary of the Entomological Society of America. If the experiment progresses favorably it seems probable that AIBS will assume full responsibility for redactory services on the JOURNAL beginning with volume 53. The JOURNAL is the first and only publication now involved in this experiment which we hope will be successful and eventually contribute much toward facilitating the editorial work on the journals of many of the member societies of AIBS. We trust that we may receive the patient cooperation of all concerned in this new venture.

CHANGES IN COMMON NAMES OF INSECTICIDES.—In the October issue of the JOURNAL OF ECONOMIC ENTOMOLOGY (Vol. 52, No. 5) there will appear "Changes in Common Names of Insecticides" consisting of one deletion and three additions to the list as compiled by the *Committee on Insecticide Terminology* of the Entomological Society of America and published in the April issue of the JOURNAL (52(2):361–362, 1959). Authors are reminded that it is mandatory for them to use the adopted common names of insecticides in all manuscripts published by the Society. Reprints of "Common Names of Insecticides" and of "Changes in Common Names of Insecticides" are available free upon request to the Executive Secretary.

MEMBERS IN THE NEWS

REGINALD H. PAINTER, Department of Entomology, Kansas State University has been awarded a grant from the Bache Fund of the National Academy of Sciences. He is spending six weeks in Mexico collecting Bombyliid flies. Dr. Painter is a leading authority on the Bombyliidae.

F. H. BUTT, retired August 15, 1959 from his position as insect morphologist on the staff in the Department of Entomology at Cornell University. He and Mrs. Butt will spend their time between their home on Lopez Island in Puget Sound and a cabin on the Anza Desert in California.

CHARLES L. HOVEY was pictured on cover IV of the May 4, 1959 issue of *Croplife*.

FRANK IRONS, agricultural engineer with the USDA in Toledo with J. D. Wilson of Ohio, have reported good results with an air blast sprayer.

MAX CARASSO's article "The Termites' Place in Nature," in the January, 1959 issue of *Nature* is a most interesting account and it is commended to your attention.

Superior Service Awards were presented this summer by the U. S. Department of Agriculture to four members with citations as follows:

MARY J. EDMANDS—For exceptional proficiency and effectiveness in the editorial review and improvement of technical scientific manuscripts and in instructing and educating authors in the more effective preparation of such papers.

JAMES K. HOLLOWAY—For meritorious service to agriculture through research that led to the successful control of the Klamath weed by biological methods.

HARRY L. PARKER—For significant contributions to our knowledge of the natural enemies of introduced pests of American agriculture, and for the promotion of international good will through scientific endeavor.

ERMA S. VANDERZANT—For outstanding service to entomology through basic research on the nutritional requirements of cotton insects which has opened the way for exploring new approaches to their control and has led to methods for rearing the boll weevil and pink bollworm in the laboratory, thus facilitating year-round controlled laboratory and field investigations.

W. A. GERSDORFF was presented a Length of Service Award for 40 years of service.

EDWIN R. WILLIS and LOUIS M. ROTH formerly with the Pioneering Research Division, Quartermaster Research and Engineering Center at Natick, Massachusetts, left there as of June 30, 1959 to begin, on July 1, 1959, an entomological laboratory in the new Central Research Laboratories of the United Fruit Company at Norwood, Massachusetts.

A. EDISON BADERTSCHER, McCormick & Company, Baltimore, Maryland, has started a consulting service. He has had a great deal of experience in compounding insecticides and in writing labels.

FRANCIS A. GUNTER of the University of California at Riverside received the 1959 Harvey W. Wiley Award of the Association of Official Agricultural Chemists. Congratulations.

V. P. I. ENTOMOLOGY DEPARTMENT

President Walter S. Newman, of Virginia Polytechnic Institute, announced the formation of three new Departments from the Biology Department as of July 1, 1959. These new Departments are Animal Science, Forestry and Wildlife Conservation and, most important to members of this Society, the Entomology Department. Dr. James McD. Grayson was appointed head of the latter Department. This setting up of new Departments is indicative of healthy growth of the biological sciences at V. P. I. Congratulations are extended to Dr. Grayson.

SOCIETY REPRESENTATIVE

Representatives of the Society to various organizations were listed on page 44 of the March 1959 BULLETIN with an additional listing on page 82 of the June 1959 BULLETIN. The following appointment has been made by President Oman.

Representative to the National Research Council, Division of Biology and Agriculture

W. H. ANDERSON, Washington, D. C..... 1962

The term of A. B. Gurney, previous Representative to the above organization, expired as of June 30, 1959. F. L. Campbell, Executive Secretary of the Division of Biology and Agriculture, expressed complete satisfaction with the service of Dr. Gurney and with the appointment of Dr. Anderson.

SOUTHEASTERN BRANCH

The Association of Cotton States Entomologists was organized in Atlanta, Georgia in December 1908. This group became the Cotton States Branch of the American Association of Economic Entomologists at the December 29, 1925 to January 1, 1926 meeting of the latter organization in Kansas City, Missouri. In accord with action taken at the February 2–4, 1959 meeting of the Branch in Memphis, Tennessee the membership was polled by mail ballot and as a result of that vote the name was changed to the Southeastern Branch of the Entomological Society of America. So, after 50 years, the name Cotton States passes into the record.

Preparations are underway for the next meeting of the Branch and the first under the new name. This will be held January 25–27, 1960 at the DeSoto Hotel in Savannah, Georgia. State members of the program committee will soon issue a formal call for papers. Titles and abstracts of not more than 50 words should be mailed to R. J. Kowal, Southeastern Forest Experiment Station, Box 2570, Asheville, North Carolina.

ELI LILLY AND COMPANY DEDICATES NEW RESEARCH CENTER FOR AGRICULTURAL SCIENCES AND VETERINARY MEDICINE AT GREENFIELD, INDIANA

On June 16, 1959 Eli Lilly and Company dedicated a new Research Center for agricultural sciences in veterinary medicine at Greenfield, Indiana. More than five hundred representatives of science, government and industry from 24 states, Canada and Yugoslavia attended the dedication.

These facilities include, in addition to the Administration Building and a new power house, a plant science building, veterinary science building, a veterinary isolation barn, and an auxiliary laboratory and greenhouse. In addition, there is a complete experimental feed mill to provide uniform standard feeds for the experimental animals, a chicken broiler house with a capacity of 10,000 chickens, and seven barns, the largest of which is 726 feet long.

These new facilities are designed to enable the Lilly Company, which has long been established in the pharmaceutical field, to expand its many products into the field of plant and animal care and nutrition.

The entomological research is in charge of Dr. Edward Campeau, a long time member of the Entomological Society of America.

Speakers for the occasion included Dr. Thomas P. Carney, Vice-President, Research, Development and Control, Eli Lilly and Company; Dr. Earl L. Butts, Dean of School of Agriculture at Purdue University; Dr. Byron T. Shaw, Administrator, Agricultural Research Service, U. S. Dept. of Agriculture; Dr. Gene F. Downing, Director, Agricultural Research Div., Eli Lilly and Company; Mr. Eugene N. Beesley, President, Eli Lilly and Company; and Dr. Don Paarlberg, Special Economic Assistant for President Eisenhower.

LEE C. TRUMAN, E.S.A. Delegate

U.S.D.A. CENTENNIAL

The United States Department of Agriculture will be 100 years old in 1962. A Centennial Staff Group has been appointed and plans for the "birthday" celebration are under study. The Agricultural Research Service member of this Centennial Staff Group is Entomological Society of America Governing Board member Ralph W. Sherman. Mr. Sherman will also act as Chairman of the Agricultural Research Service Committee on the Centennial. The committee will assist the staff group in developing information within the agency and the Department and will assist in suggesting and supplementing proposals for the participation of the Agricultural Research Service in the Centennial activities.

HONORARY DEGREES

Two of our well-known members received honorary doctorates last spring. We are pleased to print the citations which were read in conferring D. Sc. degrees on these two outstanding entomologists. Congratulations and best wishes are herewith extended.

MIRIAM AUGUSTA PALMER, beloved teacher, distinguished scientist, outstanding graduate of the University of Kansas and Colorado State University; responded to the ever-growing need for advanced scientific information vital to entomological science; distinguished as a vital teacher; learned scholar, true naturalist, and world's foremost authority on Aphidae; developed modern freshness and useful techniques into this neglected field, adapting it to the needs and demands of the present and future; contributed essential scientific information vital to identification of 450 species of aphids, a destructive group of insects; brought intelligent and constructive forces to bear upon serious economic problems of the forester, floriculturist, horticulturist, and farmer; wrote a book regarded by entomologists as the "Aphid Bible," *Aphids of the Rocky Mountain Region*, published as Memoir 5 of the Thomas Say Foundation in 1952; contributed through unremitting labor and unfailing generosity her time and knowledge for the advancement of research.

Read by President William E. Morgan at the Commencement Exercises, Colorado State University, June 5, 1959.

CHARLES PAUL ALEXANDER, in 1922 you came to this university from Cornell and curator posts in the West to assume the entomological mantle of the renowned Fernalds, father and son. For nearly thirty years you were the department head, for seven years the School of Science dean. Your technical instruction, inspiring example, and friendly faith are gratefully and lovingly remembered by a host of Massachusetts alumni. Your indefatigable explorations in the world of the elusive and ubiquitous crane fly have led to a highly significant and lasting contribution to scientific knowledge.

I, therefore, by authority of the Board of Trustees of the University of Massachusetts, confer upon you the degree of Doctor of Science, honoris causa, together with all of the rights, honors and privileges which appertain to the degree here or elsewhere. In token of this, I present you with this diploma and invest you with the appropriate hood.

Read by President J. Paul Mather at the 89th Commencement Exercises, University of Massachusetts, June 7, 1959.

NECROLOGY

BACK, ERNEST A. 78. Retired economic entomologist. Charter Member of the former Entomological Society of America, Fellow in 1938. Life Member of the former Entomological Society of America and the former American Association of Economic Entomologists. At his home in Chaplin, Connecticut, May 21, 1959.

BAKER, ARTHUR C. 74. Retired USDA Fruit Fly specialist. Forty-seven-year member, Fellow in the former Entomological Society of America. At his home in Mexico City, September 11, 1959.

COSTILLA, D. MANUEL AULLO. 76. Distinguished Spanish entomologist. In Madrid, January 29, 1959.

FOLEY, FRANCIS B. 52. U. S. Department of Agriculture economic entomologist of Whittier, California. In a fall while mountain climbing in Nevada, May 2, 1959.

GIBSON, ARTHUR. 83. Retired Dominion of Canada entomologist and Head Entomologist. President of the former Entomological Society of America, 1922, and of the former American Association of Economic Entomologists, 1926. Charter Member, Entomological Society of America, Fellow 1917, Emeritus Member. In Brockville, Ontario, April 16, 1959.

JEWETT, HOWARD H. 74. Economic entomologist. Forty-four year member. At his home in Lexington, Kentucky, April 2, 1959.

NICKELS, C. B. 61. Retired USDA economic entomologist. Forty-year member and Emeritus member. At his home in Westminster, South Carolina, December 19, 1958.

PAINTER, HENRY R. 70. Retired U. S. Department of Agriculture economic entomologist. In St. Elizabeth Hospital at West Lafayette, Indiana, May 20, 1959.

SNOW, WILLIS E. 40. Medical entomologist. In London, England. He had been on a Fullbright Scholarship to East Africa. June 12, 1959.

TATTERSFIELD, FREDERICK. 78. Retired Head, Department of Insecticides and Fungicides, Rothamstead Experiment Station, Harpenden Herts., England. May 1, 1959.

ZETEK, JAMES. 72. Retired termite specialist and naturalist of Barro Colorado Island. Emeritus Member, 53-year member. Fellow, 1939, in the former Entomological Society of America. In a hospital in Panama, June 1, 1959.

C. C. ALEXANDER MEMORIAL

Dr. G. R. Ferguson, President of Geigy Agricultural Chemicals, has announced the establishment of the C. C. Alexander Memorial Scholarship Fund at Purdue University

Mr. Alexander, who died in an airplane accident on May 12, 1959, was Research Manager of Geigy Agricultural Chemicals. He was an alumnus of the Purdue Entomology Department, Class of 1938. The scholarship, initiated at the suggestion of many of Mr. Alexander's friends both within and outside the chemical industry, will be the first perpetual fund of its kind at Purdue which will give preference to entomology students. Contributions may be made directly to the C. C. Alexander Memorial Scholarship Fund, Purdue Alumni Scholarship Foundation, Lafayette, Indiana. Dr. Ferguson said that Geigy has made a major contribution to the fund in recognition of Mr. Alexander's years of service to the Company and for his contributions to the field of agriculture as well as to mark their high esteem for him as an individual.

ENTOMOLOGY AT WISCONSIN

Effective July 1, 1959, Dr. Robert J. Dicke was appointed chairman, Department of Entomology, University of Wisconsin. Professor Dicke received his Ph.D. degree from the University of Wisconsin in 1943. After serving three years in the U. S. Navy, he was appointed as Assistant Professor in the Department of Entomology in 1946, and has been on the staff since that time. Dr. Dicke has taught the basic courses in taxonomy, morphology and medical entomology, and has been in charge of research on insects affecting man and domestic animals, and stored food products.

R. E. SNODGRASS HONORED

At brief ceremonies held on June 19, 1959, the Smithsonian Institution paid tribute to one of the Government's outstanding scientists, Dr. Robert Evans Snodgrass. Dr. Leonard Carmichael, Secretary of the Smithsonian, presented him the first copy of a book, *Studies in Invertebrate Morphology* which the Institution has just published in his honor on the occasion of his 84th birthday, July 5, 1959.

Dr. Snodgrass is universally acknowledged to be among the foremost insect anatomists and morphologists of our time, and his scholarly and painstaking work in his field has won him the admiration and respect of his colleagues throughout the world.

Eighteen of these colleagues have contributed chapters to the 422-page volume. Besides the United States, they represent Belgium, France, England, Denmark, Italy, Java, Pakistan, and Uruguay. For the most part the chapters are technical contributions. A biographical sketch and bibliography of Dr. Snodgrass are furnished by Dr. Ernestine B. Thurman, medical entomologist of the National Institutes of Health.

Dr. Snodgrass, a native of St. Louis, served more than 30 years as entomologist of the United States Department of Agriculture, retiring at the age of 70 in 1945. In 1953 he was named honorary collaborator of the Smithsonian Institution, where, at 84, he is still actively engaged in further research and writing. His publications—virtually all of them illustrated by his own meticulous drawings—cover a span of 62 years. Since his retirement he has completed 15 publications. Some of his more important works have been: *A Textbook of Arthropod Anatomy; Anatomy of the Honey Bee; Insects, Their Ways and Means of Living; Principles of Insect Morphology; Insect Metamorphosis;* and *Crustacean Metamorphoses.*

Dr. Snodgrass is an Honorary Member of the Entomological Society of America. Our officers and members join in congratulating him upon the honor bestowed and upon his 84th birthday.

P. D. SANDERS RECEIVES AWARD

The American Feed Manufacturers Association presented their first "Animal Agriculture Award for Editors" to Dr. P. D. Sanders. P. D. is an escaped entomologist who has been Editor of the *Southern Planter* for some 25 years. The award was in recognition of the best editorial program in the nation on the profitable production of meat, milk and eggs.

Dr. Sanders, upon receipt of the award, responded with approriate remarks.

The congratulations of the Entomological Society of America are extended to 35-year member Sanders for this deserved recognition.

D. H. HILL LIBRARY

The D. H. Hill Library at North Carolina State College has acquired a 6,200-volume collection of entomological books. Many of the volumes are rare, very rare, and scarce. The collection weighed 5½ tons together with the packing. It was originally owned by Dr. Friedrich F. Tippmann, a Viennese engineer and amateur entomologist for most of his life. We feel this is a magnificent acquisition for North Carolina State College and know that we will be able to make good use of it, and we want our friends from other institutions to know about it so that they also can make use of the collection either by visiting it here or through interlibrary loans. The vast majority of the items were not previously in the North Carolina State College Library, and a considerable number of the items are almost unprocurable today.

C. F. SMITH

NEW ENTOMOLOGICAL SOCIETY IN PERU

The writer had the pleasure of meeting with Dr. de la Torre, Secretary of the new Entomological Society in Peru, on May 25, 1959 in Lima. He presented me with a copy (Vol. 1, No. 1) of the new publication, the Bulletin of the Agricultural Entomology Society of Peru (*Boletin da la Sociedad Entomologica Agricola del Peru*). The Bulletin covers administrative, social and cultural activities of the Society members and will include invitational papers, reviews of books, summaries of articles of other publications (revistas), and other material judged to be of great interest to the members.

The Society was founded June 30, 1956. Technical papers are published in the Revista Peruana de Entomologia Agricola, which is scheduled to appear semi-annually. (Volume 1, No. 1 appeared in June 1958; at that time it was planned for it to appear once each year.)

Both the *Revista* and the *Boletin* appear semi-annually on paper of excellent quality, clear print, and in general in the style of the JOURNAL OF ECONOMIC ENTOMOLOGY, the *Revista* corresponding to our JOURNAL, and the *Boletin* to our BULLETIN. Dr. de la Torre took pride in telling about their publication and annual meetings, and that they had followed closely the organization of the Entomological Society of America's JOURNAL and BULLETIN.

Considerable emphasis is given in Peru to various types of biological control. The seal of the society includes a branch of cotton, a stalk of corn, and a coccinellid (*Eriopis conneza* (Germ.)). This respect for biological control probably dates from around 1909 when the U. S. entomologist Charles H. T. Townsend went to Peru to aid in controlling a cotton scale (*Pinnaspis minor* Mask.) and solved the "catastrophic" problem with biological control. United States medical and veterinary entomologists should be warned that in most South American countries, their field is not represented in agricultural entomology. Insects affecting livestock are largely the province of veterinary medicine.

The *Boletin* urges those of the society members aspiring to publish in these Peruvian publications to consult the

latest copies of publications of the Entomological Society of America and the Peruvian counterpart, the *Revista*, for correct scientific names of insects and insecticides. However, our insecticide names must be translated into Spanish before submittal to the editors.

The Entomological Society of America wishes the new Society in Peru much success and suggests that members wishing to subscribe to the new journal will be rewarded with many useful and interesting scientific papers.

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NEW PUBLICATIONS

INFESTATION CONTROL.—A SERVICE TO AGRICULTURE AND FOOD STORAGE. 32 pp. + 12 plates of photographs. Published by Her Majesty's Stationery Office. 1958. May be purchased from York House, Kingsway, London, w.c. 2 or through any bookseller. Price 4s. (by mail 4s. 5d.).

This attractive and well-illustrated booklet describes fumigation and other modern methods of dealing with stored products insects, new methods for controlling other pests—and gives the history of pest control during the last 45 years.

A REVIEW OF THE CRABHOLE MOSQUITOES OF THE GENUS DEINOCERITES (DIPTERA, CULICIDAE). By John N. Belkin and Charles L. Hogue, University of California Publications in Entomology 14:411–458, 41 figures, April 22, 1959.

GRASSHOPPERS OF THE MEXICANUS GROUP, GENUS MELANOPLUS (ORTHOPTERA: ACRIDIDAE). By Ashley B. Gurney and A. R. Brooks. No. 3416.—From the Proceedings of the United States National Museum, Vol. 110, pp. 1–93, 18 figs., 5 pls. Issued July 9, 1959. Smithsonian Institution, Washington 25, D. C.

TABANIDAE (DIPTERA). Philippine Zoological Expedition 1946–1947. By Cornelius B. Philip. Fieldiana: Zoology, Volume 33, Number 6. Published by Chicago Natural History Museum, April 30, 1959.

1959 AMERICAN TOMATO YEARBOOK. John W. Carncross, Editor; C. Stedman Macfarland, Jr., Publisher, 8 Elm Street, Westfield, N. J., 40 pp., price $2.00. The book is profusely illustrated with up-to-date charts, graphs, and pictures, giving a complete resume of the tomato industry. A complete volume, 1951–1959, is available at $12.00.

BIBLIOGRAPHY OF ENTOMOLOGY IN TAIWAN (1684–1957) by Shui-chen Chiu, Entomologist of Taiwan Agricultural Research Institute. xii + 246 pages. 18 x 26 cm. paper covers. December, 1958. U. S. $2.00 each copy, post free. Contents are as follows: Taiwan Entomology in General • Destructive Insects and Their Control • Medical Entomology • Insecticides • Beneficial Insects and Their Utilization • Insect Taxonomy • (Written in 7 languages).

Orders should be addressed to the Curator, Miss Shui-chen Chiu, Insect Collections, Taiwan Agricultural Research Institute, Sec. 4, Roosevelt Road, Taipei, Taiwan (Formosa), China.

AMERICAN POTATO YEARBOOK. The 1959 edition contains 80 pages of information vital to the potato grower, shipper, jobber, agricultural teacher, research specialist, and others connected with potatoes in any way. Order from the American Potato Yearbook, P. O. Box 540, Westfield, N. J. $2.00. A complete set, 1950–1959, is available at $12.00.

HANDBOOK OF TOXICOLOGY Volume IV: Tranquilizers. Analysis and Compilation by Maxwell Gordon and R. F. J. McCandless with the technical assistance of S. W. Lipsman. Edited by Rudolph M. Grebe. Prepared under the direction of the Committee on the Handbook of Biological Data, Division of Biology and Agriculture, The National Academy of Sciences, The National Research Council. 120 pp. April 15, 1959. W. B. Saunders Company, Philadelphia, Pa. Price: $4.00.

HANDBOOK OF TOXICOLOGY Volume V: Fungicides. Analysis and Compilation by Everett F. Davis, Barbara L. Tuma, and Lucy C. Lee. Edited by Dorothy S. Dittmer. Prepared under the direction of the Committee on the Handbook of Biological Data, Division of Biology and Agriculture, The National Academy of Sciences, The National Research Council. 242 pp. April 15, 1959. W. B. Saunders Company, Philadelphia, Pa. Price: $5.50.

ACAROLOGIA—A new journal devoted to the Acarina is now in volume I. Published by Marc André, 8 bis Avenue Thiers, LaVarenne (Seine), France, it is to appear quarterly at a foreign subscription price of 4,200 francs. Manuscripts are acceptable in any of the languages adopted by the international congress. Fascicles 1 and 2 have appeared and contain 13 and 7 papers, respectively.

GENERAL CATALOG OF THE HOMOPTERA. By Z. P. Metcalf. Fascicle IV, Superfamily Fulgoridae was published by North Carolina State College. Catalogs of other superfamilies are planned. Information available from C. F. Smith, Box 5215, North Carolina State College, Raleigh, North Carolina.

CYNIPID GALLS OF THE EASTERN UNITED STATES, AN AID TO THEIR IDENTIFICATION. By Lewis H. Weld. 160 pages, 354 figures, paper covers. Published by the author, 1959. For sale by the Entomological Society of Washington, Division of insects, U. S. National Museum, Washington 25, D. C., or by the author at 6613 N. Washington Boulevard, Arlington 13, Virginia. $2.00 postpaid.

BOOK REVIEW

THE WORLD OF INSECTS, by Paul Pesson. Translated by R. B. Freeman. McGraw-Hill Book Company, Inc., New York, 1959, 8½ x 11 inches, 204 pp. illus. $15.00.

In many ways this is an unusually handsome and informative book, written by an entomologist of the Institut National Agronomique in Paris. Although the illustrations are not coordinated with the text as well as might be expected they make up an important part of the book. Because of their abundance and excellence they should serve to attract the attention and hold the interest of many readers previously having only slight, if any, interest in insects. There are 96 plates (16 in full color) which include more than 200 extraordinary photographs, 52 of which are in color and some of which are outstanding, such as the one illustrating protective coloration and color change in the same species of grasshopper against six different backgrounds, or the one illustrating a vespid wasp drinking from a drop of water.

This book is not only a "picture book" but on the whole, an informative, technically accurate text providing much material about the nature of insects, their history and evolution, their variations, adaptations, respiration, and many other facts about the way insects live and reproduce. Predatory and parasitic species are discussed as well as such technical subjects as mechanisms for water conservation, embryology and development, sense organs and behavior. A brief summary of the classification of insects is included and a final chapter on insects and man.

The World of Insects provides an excellent introduction to some of nature's most unusual creatures, the insects. It offers absorbing and informative reading to those who wish a general review of the subject, together with many fascinating photographs of insects in all stages of their development.

F. W. Poos